



FRIDAY, NOVEMBER 24, 1899

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The New East River Bridge.

Last week we gave the more important requirements contained in the specifications for the additional material and work on the New East River Bridge. As there noted, bids will be opened Dec. 7 for cables, cable bands, suspenders and suspender connections. Some details of the parts to be contracted for are shown in the accompanying engravings.

The general arrangement of the cables and suspenders is shown in outline, with the panel points numbered, in Fig. 1, and the design and general location of the cable clamps and anchor-chains are illustrated in Fig. 2.

The cables connect just inside the masonry with I-bars of the anchor chains as shown in Figs. 1 and 2. Up to the cable clamp shown in Fig. 2, the strands are all bound together by the suspender saddles and cable bands and from this point the strands diverge from their positions in the normal section of the cable to their respective I-bars of the anchor chains to which they are attached.

All cable bands and suspender saddles are made of steel castings, finished inside and bolted, as shown in Figs. 4 and 5.

There are 281 steel wires in each of the 37 strands. These wires are No. 8 Birmingham wire gage and are 0.165 in. in diameter. They are to be not less than 4,000 ft. in length and will be spliced by a right and left sleeve-nut splice similar to those used on the New York and Brooklyn Bridge and shown in Fig. 3 unless another design acceptable to the engineer is submitted. The splices must be made so as to have a strength of at least 95 per cent. of the strength of the wire and the one which will do this with the least increase in size above that of the wire, will be approved. The one here shown

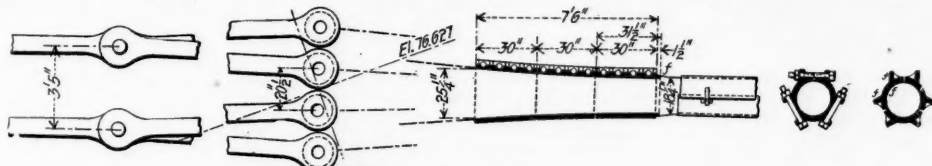


Fig. 2.—Anchor Chains and Cable Clamps.

gives the full sections to the strand at the ends of the splice piece, but tapers slightly toward the center from each end and the joint is locked when the ends of the wires come together. As each of the 37 strands passes over the strand shoe it diverges to its respective I-bar of the anchor chains. These strand shoes are shown in Fig. 7 and are placed at the last pins of the anchor chains, as shown in dotted circles, Fig. 2.

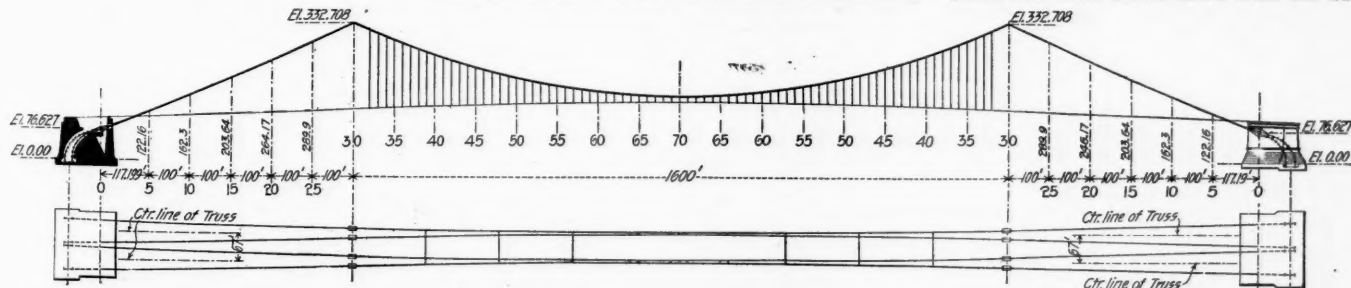


Fig. 1.—Elevation and Plan of Cables New East River Bridge.

In Fig. 4 is shown the method of fastening the suspended structure to the cables. The temporary adjusting block, as shown in the lower part of the engraving to the left, has a bearing edge at O, and when the suspended parts have been put in

place and adjusted by means of the bolts A and B the lower bolts are clamped and the adjusting block removed. The view to the right shows this detail after the adjustment has been made and the block removed. In the upper part of this engraving is shown one of the bands on one of the cables, to which is attached a 1 1/4-in. steel wire rope, and the adjusting clamp is shown in section. The view to the right shows the method of fastening a cable clamp to one of the cables.

When all the wires of a strand have been laid and before the shoe is placed in its final position on the pin, the strand will be banded by five or six turns of No. 10 steel wire, securely locked, placed at intervals of not more than five feet. When all the strands for a cable are complete, the temporary wire bands will be removed; all the wires of the cable will be brought together, compactly, into a cylindrical form, and the main cable bands will be put on and screwed up so as to grip the cable firmly. The main bands will be spaced at intervals of about 20 ft., measured horizontally. Intermediate bands, composed of eight turns of No. 8 B. w. g. steel wire, securely locked at the ends, will be spaced at intervals of about four feet between the main bands.

The ties, which are placed at points 39, 48 and 57 (see plan, Fig. 1) are shown in the lower engraving of Fig. 5. There are but six of these, and their principal use is to bind the cables together laterally so as to preserve the proper cradling. A view of the cable covering (which is made up of steel plates) is shown in Fig. 6. These plates are each 1/8 in. thick with straps 1 1/2 in. x 1/4 in., and extend from main band to main band and overlap at the joints so as to

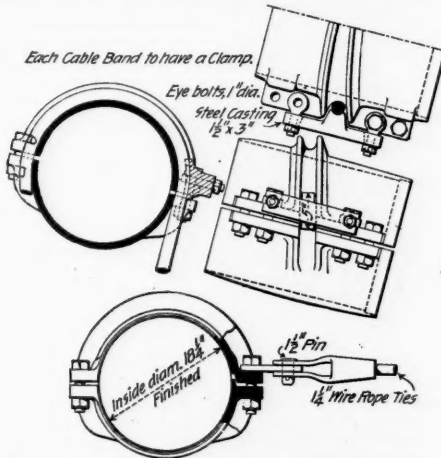


Fig. 5.—Cross Tie, Cable Band, and Suspender Saddle.

shed water and keep the cable wires dry. This is believed to be the first time this method has been used for protecting the cables of suspension bridges.

In addition to the details given last week it may be mentioned that the method of making and the chemical requirements for the steel for all bolts, bolt ends, nuts and cover plates must be the same as those for the wire and must have the following

physical requirements: Maximum ultimate strength, 68,000 lbs. per sq. in.; minimum, 60,000 lbs.; maximum elastic limit, 35,000 lbs. per sq. in., and minimum percentage of elongation in eight inches, 20 per cent.

It may be noted that no percentage of carbon is specified. The minimum percentage of the other elements in the finished steel, together with the specification for the ultimate strength of 200,000 lbs. or more per sq. in. (for the wire) and an elongation of

at least 2 1/2 per cent. in five feet and at least 5 per cent. in eight inches, practically fixes the percentage of carbon and leaves it to the maker to determine the exact amount which will meet the physical requirements. It may be noted that the specifica-

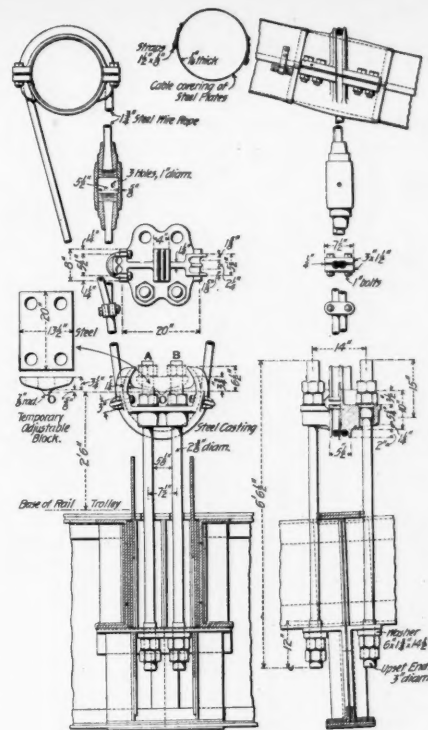


Fig. 4.—Suspender Connections.

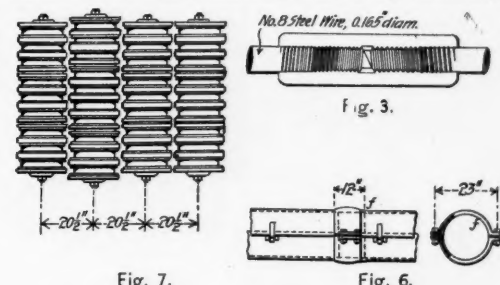
tions require that during the reduction of the steel in the open hearth furnace it shall not be decarbonized below 0.10 of one per cent.

The Retirement of President Clark.

By Clarence Deming.

The retirement of President C. P. Clark, of the New York, New Haven & Hartford (Consolidated) Railroad Company, closes an epoch of twelve years in the history of that corporation filled with events which in dramatic and picturesque quality we shall probably find unequaled in the annals of railroad-ing within the same limits of time and geographical area. It is the story of an ultra-conservative policy abruptly changed into a radical one, of swift and extensive consolidation of lines, of vastly expanded terminals, of sharp conflicts in the legislatures and the courts, of electrical competition met and, to a large degree mastered, of supremacy in the boat lines of the Sound, of improved service and cheaper fares—and all this through the dominating character of a single man who in himself has been practically the corporation.

The opening of the first year of the epoch takes us back to the company and its plant as they were early



in 1887. The policy of the corporation had been for years so quaint and slow as to be almost reactionary. The time is within the easy memory of young men when the sign "no freight received after 4 p. m." was big lettered on the freight depot at New Haven. The corporation directors expressed lofty scorn of freight as being business which had to be "handled" while passenger traffic "handled itself." A story of unquestioned truth comes down from the administra-

tion preceding that of President Clark and hits off well the old and conservative regime. The Consolidated Railroad Directors had been discussing a proposed new passenger train. It was bitterly opposed by a Director. Quoth he, "If we put on that

train it won't be a week before people will be crowding it; then we'll have to put on another."

The so-called Consolidated Railroad of those days was relatively a meagre thing. It had a single track mileage of 524, now 3,986. It had a Harlem terminal, but undeveloped, and eastward and northward the lines of the company ended at Northampton, Springfield, Willimantic and New London. Its stock was and had been for years \$15,500,000, as contrasted with \$54,641,400 now. Gross earnings were \$8,204,577 in 1887, as contrasted with \$40,927,843 in 1899. It owned no Sound boat lines and was hurt by their competitions. It took in twice as much money from passengers as from freight. It was unpopular with the people. It was paying dividends of 10 per cent. and was disguising surplus, but had no broad and forecasting policy.

The aggressive methods of President Clark may be traced hurriedly along several distinct lines, each with ramifications too many to be followed out. First and most prominent has been the direct absorption of connected roads. That policy opened immediately in 1887 with the lease of the Naugatuck road, now a rich feeder, followed by the merger in 1892 with the New York, Providence & Boston, carrying with it the Providence & Worcester and two profitable Sound boat lines. Following quickly came the lease of the Old Colony system with its control of the Boston & Providence, and taking with it two Boston terminals and the Fall River boats. With the absorption of the Housatonic system was removed the last danger of a competing parallel, and four years ago purchase of control of the New England transferred also the Norwich & Worcester, with the annexed boat line, and practically completed the territorial monopoly of Southern New England and of the Sound. By the Tariffville extension of the Poughkeepsie Bridge system the monopoly is now somewhat threatened, and it may be stated that, but for opposition to Mr. Clark in the standing committee of the company, some two years ago, that system too would have been added to the Consolidated—a mistake that the corporation may have cause to regret even more than it does now.

Second in importance as a part of Mr. Clark's policy has been the development of terminals. To that category belong especially the Harlem Terminal as the conduit of an immense freight traffic, and the Union South passenger station at Boston, unique in size and accommodations among the railroad stations of the world. The millions poured into these terminals, with other millions perhaps to come, must wait for demonstration of the wisdom of the expenditure; but with so many railroad systems outgrowing the terminals which a few years ago seemed too ample, the results can hardly be doubted.

Third in importance has been the development of the freight traffic of the road, once ignored. While this has been due chiefly to the absorption of lines more largely freight carriers than the original trunk line, a considerable fraction must be charged to terminal facilities, new contracts with trunk lines and a "nursing" policy. Finally, not so extensive in present realization as in its future prospects, has been the policy of Mr. Clark in electric competition, his unique ventures with the third rail and his purchase of Connecticut trolleys to break threatened long parallels. If we add the four-tracking of the New York Division, the abolishing of grade crossings on a vast and expensive scale, the adoption of the block system, the improvement of service and the voluntary reduction of fares to two cents a mile on a large part of the Consolidated system, the condensed record of Mr. Clark's remarkable administration becomes substantially complete. The table annexed to some extent expresses it in figures:

	1887.	1899.
Condensed balance sheet.....	\$21,885,033	\$100,240,421
Construction and equipment.....	16,437,604	59,072,069
Single track miles.....	524	3,986
Gross earnings.....	\$8,204,577	\$40,927,843
Operating expenses.....	6,460,685	33,858,829
Capital stock.....	15,500,000	54,641,400
Funded debt.....	9,425,000	47,677,000
Debentures.....	137	19,397,500
Locomotives.....	137	917
Passenger cars.....	411	1,816
Freight cars.....	3,136	12,490

The bold and absorptive policy has not been without its flaws of detail and its dangers, some of them not yet outlived. Local improvements have whetted the demand of the public for others, and the demand does not decrease. Some looseness of administrative detail has crept in under an autocracy burdened with rapid and great schemes. Stockholders complain of sinecures, of improvements too esthetic, of two men who do one man's work in a corporation whose growing revenues never yet have felt the pressure of close economy. Men in high official position in the Consolidated company even now ask whether it might not have been better to have followed out Mr. Clark's original plan before he became President, of purchasing, relatively for a song, the New England, developing it as a through line and leaving the Old Colony system to shift for itself. To that question the absolutely profitable but relatively unprofitable record of the Boston & Albany, more weakly placed than the Consolidated, perhaps gives a reply.

Two dramatic incidents in Mr. Clark's career as President may be hastily reviewed. Some seven years ago the Consolidated and Connecticut River

directorates had announced their plans for the lease of the latter property to the larger system. The Napoleonic stroke of the spectacular McLeod, then in control of the Boston & Maine and Reading, will be recalled—his purchase of Connecticut River control at a great price, his defeat of the lease, his offer to the Old Colony which forced President Clark to take that large system, the downfall of McLeod, the succession of President Tuttle and the subsequent "partition of Poland" by which, under agreement, Southern New England territory went to the Consolidated and Northern New England to the Boston & Maine. Deeper in its shadows was the great parallel railroad fight of 1889 in the Connecticut Legislature, when the "New England combination," using the Housatonic as its base line, sought from the Connecticut General Assembly license for a through parallel and the contest was joined in the lower house, consisting of some 250 Representatives. The legislative corruptions of that conflict, in which, by current report \$400,000 was spent, has left a long trail in the lobby and survive unto this day at the State capitol.

The future of the great railroad system which President Clark has so strenuously built up is big with queries. Will it remain an independent system, entrenched in its territorial monopoly, or will the Consolidated road take the next logical step in these days of swift railroad mergers and be itself consolidated with a larger corporation; and, if it be merged, will it go to the New York Central or to the Pennsylvania at some risk under the contracts with the New York Central and Harlem of losing terminal and trackage rights below Woodlawn? The answer may come soon or it may come late. But whatever the answer may be, the work of President Clark stands fast and sure as that of a railroad architect who, whatever other criticism may be paid, elected care, responsibility and toll where he might have chosen comparative ease; who brought to his great task singleness of purpose in behalf of the stockholders and unquestioned purity of act; and who, as a personality, was approachable and gracious, never played the martinet, and in matters of administrative discipline was even too kind.

The Railway Signaling Club.

The annual meeting of this club was held at Boston, Nov. 14. President A. M. Keppel, Jr. (Pennsylvania), presided and about 30 members were present. About a dozen new members were elected. The annual report of the Treasurer showed a prosperous financial condition, there being about \$200 in the treasury. The papers by Messrs. Wilson, Rhea and Sperry, which had been printed and distributed (and which have been reported in the Railroad Gazette), were not read. The first one discussed was that of Mr. Wilson, in which he showed how much less it costs to maintain the batteries for automatic signals which stand normally at danger than for those which stand normally at clear.

Mr. Brangs (D., L. & W.): It is difficult to make an accurate comparison of the life of batteries on our normally danger system, for the reason that we feed our indicator circuits, which necessarily are operated on the normally clear principle, from the same batteries that operate our normally danger signals. The actual saving in battery is just as apparent, however, as the battery is in use for the signal only while the train is passing through the block. On the D., L. & W. there are a great many signals on long sections, where there are no switches, where the life of batteries is from 13 to 18 months. In these cases the battery is used exclusively for signals operated normally danger. Mr. Brangs has had the usual difficulties with fusion of points by lightning, but is convinced that with carbon point relays and improved lightning arresters the trouble will be done away with.

Mr. Yocum (P. & R.) finds that the expense for batteries in the normal danger system is 30 per cent. less than in the other. The additional element of danger in using the back contact of the relay has been mentioned as a criticism, but on the Philadelphia & Reading this contact has failed only one time in 500,000 movements. Where trains are very numerous the saving in expense by using the normal-danger is, of course, less than on lines which are not busy.

Mr. Miles (M. C.): We are told that the normal-danger plan has two features of merit: the batteries cost less and the signal is less likely to stick in the all-clear position. The latter, however, is not now a serious danger in any signal, and therefore the matter of cost is the main question, though with the normal-danger more line wire is necessary, which increases the cost and the liability to derangement by lightning.

Mr. Yocum: We use a special clearing relay and require no line wire for the home signal except where there is a facing point switch in the block.

Mr. Blodgett (B. & A.): The fears which have been expressed concerning the possibilities of error in normal-danger working are, I think, overestimated. Much has been said about the impossibility of conveniently inspecting signals which stand at danger when the block is clear; but this point is raised by

those people who test by riding on the rear end of a train. The proper way to test the signals is to walk over the road and find out the condition of each block by operating the signals of the preceding block. Mr. Blodgett has used the normal danger for several years, in a considerable number of signals, and has had no instance of a signal showing clear when it should show danger.

Mr. Balliet (L. V.): As we all know, a vital feature of automatic signaling is constant and intelligent inspection; money used for the most thorough work in this line is well expended. Inspectors should not ride on trains.

Mr. Miles (M. C.): We have 145 miles of road, double tracked, equipped with block signals; and have had only one failure to properly show danger this year; that was where a boy threw a stone and damaged the disk so that it rubbed against the side of the case.

Mr. Sperry (U. S. & S. Co.): Too much emphasis is laid on theoretical points. The argument for normal danger is based on the claim that that principle is so important that it should be made universal; but how about switch signals? They are everywhere kept normally clear. Interlocking signals are kept normally at danger, but this is only because that is an element of the most convenient plan for using them; and there are exceptions to this at crossings where the trains of one of the two roads are very infrequent. Train order signals are kept normally at danger, and thus we have the two different principles constantly in use everywhere. The argument that normal-clear is dangerous because automatic signals will freeze up, is unsound, because the best automatic signals are now free from that danger.

Mr. Wilson: As to the necessity of more line wire for the normal-danger, the Lehigh Valley has 600 automatic signals and the Philadelphia & Reading has 75 miles, but neither has more line wire than would be used for normal clear.

The next discussion was on Mr. Rhea's paper.* In reply to questions it was stated that apparatus for automatically setting a semaphore in either one of three different positions, with unfailing accuracy, could be had of the Union Switch & Signal Company. A few signals of this kind have been in operation two years and they have done their work perfectly.

At this point Mr. Rhea, replying to criticisms, explained that in order to provide for an alleged inconsistency in using the caution or distant indication to authorize a movement over a diverging route (in an interlocking plant) he would have at every interlocking plant a starting signal; that is to say, he would place a block signal, marking the beginning of a block section, at the outgoing end of the section of track governed by the interlocking signals. Then the three-position signal (home signal) at the beginning of the interlocked territory could be worked consistently. When in the 45-degree position its arm would indicate either that the way was open over a diverging track or for a movement for a very limited distance on the main track.

In the discussion of Mr. Sperry's paper the first subject taken up was yellow glasses for the lamps of distant signals. It was stated that the Canadian Pacific has adopted this color for use with the lamps of all its distant signals. The Chicago & Eastern Illinois has decided to use green for all clear, but has not decided what to use for the lights of distant signals. Further discussion of this subject was postponed until after the members could make an inspection, after dark, of the yellow lights now in use at the Boston Terminal yard.

In discussing the question whether the main-line indication (on a post with two or more blades) should always be shown by the upper arm of a home signal instead of having the upper arm always indicate the route to the right, it was shown that a number of engineers on the Pennsylvania Railroad, who objected strongly to the change, were questioned some time after the change was made and were all found to be in favor of the new plan.

In a discussion on the use of iron pipes, filled with oil, in the place of boxing, for carrying signal wires beneath highway crossings, it appeared that with half-inch pipes there has sometimes been difficulty, especially in cold weather, but with one-inch pipes the plan appears to have proved uniformly successful. Mr. Tilton (C. M. & St. P.) has had wires running in oil five years with satisfactory results. A one-inch pipe is used for each wire.

At the evening session, after the members had visited the Terminal Company's yard, there was a spirited though desultory discussion of yellow glass. The feature of the discussion was the mass of testimony showing that the necessity of using green, or some other color than "white," for the all-clear indication at the home signal, is much more generally realized than it was a few years ago. Several members reported cases of white lights in buildings or in streets which had been mistaken for signal lights, and in some cases had caused slight accidents; and there was no member who spoke in favor of

* In the abstract of this paper published in the Railroad Gazette Nov. 10, a mistake in lettering the diagram made nonsense of the description of the method proposed by Mr. Rhea. The paper is therefore reprinted in full in this issue.—Editor.

the continuance of white for all-clear. At the same time the feeling that yellow, if dark, will prove to be too near like red, and if light would be too near like white, was very generally expressed. Two or three members declared themselves unequivocally in favor of yellow, but the majority seemed to cling to the hope that some better solution would be found; while at the same time nothing decided was said in favor of the Chicago & Northwestern distant signal (a green and a red light side by side). It should be said, however, that no representative of that road was present. One prominent member felt sure that the glass makers would yet give us a better third color. Another member thought that red lights in a smoky atmosphere would look like the yellow, and thus introduce an element of danger, but he produced no evidence to support this view, and mention was at once made of the testimony of experience to the effect that the opposite is true; that even a common "white" light sometimes looks reddish in a smoky atmosphere.

Another member advocated the use of two yellow lights at the distant signal; this would prevent any confusion between home and distant.

Mr. W. F. Potter, Superintendent of the Long Island road, was present at the evening session, and, being asked for his views, replied that he was on record in the American Railway Association six years ago in favor of green for all-clear; but he is still waiting for a satisfactory night distant signal.

The election of officers resulted in the re-election of A. M. Keppel, Jr., of Pittsburgh, as President, and C. O. Tilton (C. M. & St. P.), West Milwaukee, Wis., as Secretary. C. C. Rosenberg (L. V.) was chosen Vice-President and Frank Rhea (Penn. Lines), Pittsburgh, member of the Executive Committee.

The next annual meeting (November, 1900) will be held in St. Louis, Mo.

On Wednesday morning the members of the Club visited the new South Station of the Boston Terminal Company and inspected the station, its power plant, the yard with its electro-pneumatic signalling plant, the largest in the world, and the Scherzer rolling lift bridge. They were shown about the buildings and grounds by General Manager John C. Sanborn, Chief Engineer George B. Francis, Signal Supervisor Mann, Superintendent J. H. French, of the Plymouth Division of the New York, New Haven & Hartford, and J. P. Coleman, of the Union Switch & Signal Company, who is now putting the finishing touches on the switch and signal work of the yard.

The Charles River Drawbridge at Boston.*

The new bridge over the Charles River, connecting Boston with Charlestown, has been practically completed and will soon be open for general use. The only direct connection between Charlestown and the city proper at present is by way of the Warren bridge, which crosses the river at a point just east of the old Fitchburg railroad station, and some distance west of the new bridge. Two narrow streets form the approaches to the Warren bridge, one from Causeway Street on the Boston side, and the other (about a quarter of a mile in length) from City Square, Charlestown. The new bridge will relieve the congestion at the Warren bridge, besides providing a means of crossing the river for the elevated trains, the structure for which is being built.

The total length of the new bridge is 1,970 ft., the draw span being 240 ft. long and the approaches (over land) 880 ft. The width is 100 ft. over all, including 12-ft. sidewalks, two 35-ft. roadways, and two standard gage tracks for surface traffic, directly under the double track elevated structure. The roadway of the bridge proper is of Belgian block pavement, tarred and gravelled. The draw hangs 23 ft. clear above mean high water, and the two channels are each 50 ft. wide. The foundation pier is of cement concrete topped with granite blocks.

The turn-table is a ring of iron sections, 54 ft. in diameter, on which are mounted 70 bearing wheels 24 in. in diameter. The machinery on the bridge is all worked by electricity, the turning being done by two 28 h. p. General Electric railway motors, connected as shown in the accompanying engravings. One motor is mounted in this manner on the under side of the bridge, on each end of a diameter of the turn-table, and the motor shaft is geared down until a comparatively slow speed is reached at the rack on the turn-table. This is made up of heavy cast steel sections. About one minute will be required for opening or closing the draw.

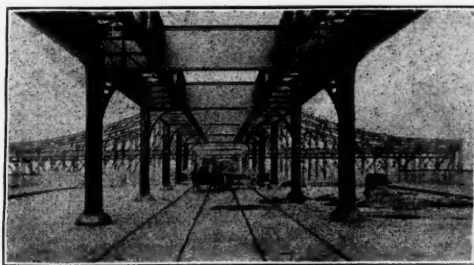
The most interesting mechanical feature is the apparatus for taking the weight of the ends of the draw spans from the fixed abutments on which they rest when the draw is closed.

There are used two vertical triplex pressure pumps, one two-stage high service air compressor and four quick-action rams, having a traverse of about 3 inches when worked under 1,800 lbs. pressure. The fluid used is petroleum, chosen on account of its viscosity, its non-freezing at very low temperatures, and its permanence. The rams will work under 1,800

lbs., but all parts of the apparatus are tested to 3,500 lbs. At these pressures, common pipe and fittings are discarded, and the elbow is replaced by a solid cube of pressed steel, into which two holes are drilled half way through at right angles, and threaded for double extra heavy pipe.

The pressure reservoir consists of six 6-in. seamless steel tubes into which a partial supply of air is forced from the air compressor. The fluid is then pumped in from the 1½ x 8 in. pumps until the desired pressure is obtained. Both pumps and compressor are worked by iron-clad electric motors mounted on the same bed plates and connected by fiber gears with the machinery.

This special apparatus is contained in a room built inside the turn-table directly under the center of the draw. It is practically moisture-proof, a heavy copper roof having been put under the roadway, and cannot be seen from any point on the bridge. A



Charles River Drawbridge, Boston, Mass.

row of narrow windows admits light on three sides of the pumping room, and provision is made for connecting lamps in series of five on the 500-volt circuit.

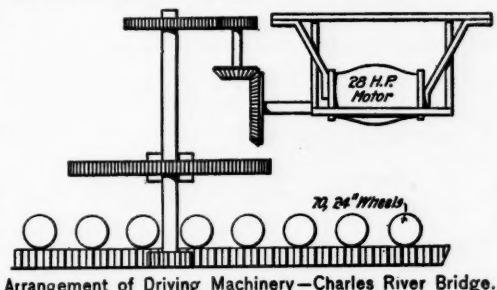
Work on the bridge was begun early in the summer of 1896. It is under the general charge of the Boston Transit Commission, and the plans were prepared by the Engineering Department of the City of Boston. The general contractors for the structure are Miller and Shaw of Cambridgeport, Mass. The metal was furnished by the Pencoyd Iron Works. The motors for turning the bridge were built by the General Electric Company. The pumping machinery was supplied by the Stilwell-Bierce and Smith-Valle Co., of Dayton, O., and the motors attached thereto by the Thresher Electric Company, also of Dayton.

The elevated railroad, of which the bridge forms a vital part, has been completed from a point about 600 ft. north of City Square to and over the bridge; and at the other end of the city, along Washington Street from the point where the tracks of the N. Y., N. H. & H. Railroad cross that thoroughfare, southward to Dover Street. The connecting link will be through Harrison Avenue, past the new South Station, and along the water front by way of Atlantic Avenue to the North Station.

The draw is shown in an open position in the engraving, from a photograph. The part of the elevated structure seen in the engraving gives a fair notion of its substantial construction; it is heavy, but well-proportioned.

The Steel Freight Car.

In 1888 there was offered to the railroad world a pressed steel stake-pocket, which it was hoped would supplant the cast iron one then in common use, being lighter, stronger and cheaper. Although the saving in weight was considered by many as of little account, the strength, price and service rendered demonstrated its value and the sales steadily increased. The success of the stake-pocket led to other pressed steel specialties. All were carefully



Arrangement of Driving Machinery—Charles River Bridge.

designed, and all saved weight in comparison with the cast iron parts they were intended to replace. After designs had been made for nearly all of the light parts, attention was turned to the heavier details and pressed steel bolsters were brought out. Again weight was saved and by actual demonstration it was shown that the running stresses applied to the stiff pressed steel bolster were very considerably less than those put upon the more or less yielding flitch plate bolster under exactly the same conditions of load and speed. Then came the pressed steel truck, and finally, with all of the minor details at hand, they were modified as the requirements demanded and the complete pressed steel car was put on the market.

In 1873, the year of the adoption of the first M. C.

B. standard axle, the average light weight of the ordinary box car was about the same as that of the full car load, or ten tons. At that time there was a very material advantage in the use of the four-wheeled English car, where the dead weight was in proportion to the paying load as about three-quarters to one. As the nominal capacity of the cars was increased the proportion of dead weight was lessened, until in cars of 60,000 lbs. capacity the dead weight had been increased only 8,000 or 9,000 lbs. over what it has been in the 20,000 lb. cars. The saving effected by the large cars, both in first cost and the expense of haul per ton-mile, led to some erratic endeavors to secure still higher capacities. Several attempts in the construction of steel cars followed and much valuable experience was gained.

Meanwhile the Schoen Pressed Steel Co. was at work in this country and the Fox Pressed Steel Co., in Leeds, England, in the perfection of machinery for making large pressed steel parts. Some cars with pressed steel sills were built in England in 1894, and in 1897 the first pressed steel cars were built in this country. The latter had a capacity of 100,000 lbs. A service of two years on the Pittsburgh, Bessemer & Lake Erie Railroad demonstrated their value. It was in March, 1897, that the first large order for pressed steel cars of 100,000 lbs. capacity was placed by the Pittsburgh, Bessemer & Lake Erie. These cars weighed 31,750 lbs., giving a ratio of paying to dead load of about 3.15 to 1. An outline of the saving effected by the use of these cars can easily be obtained. Let the average train tonnage from Lake Erie to Bessemer be taken as 2,300 tons, including cars and lading. This, taken in cars of 60,000 lbs. capacity and 29,000 lbs. in weight, would require 51 cars. If the same tonnage were to be hauled using pressed steel cars of 100,000 lbs. capacity and weighing 31,750 lbs., each 35 cars would be required. The excess of actual paying freight in the latter case would be 220 tons. The distance from Conneaut Harbor to Bessemer is 154 miles, and at 3.92 mills per ton-mile the actual net increase of revenue for each train over the division is \$132.81.

It is quite possible, however, that even this saving might be more than eaten up in the increased cost of maintenance. This was the fear entertained by many railroad men and was one of the checks that kept the cautious from placing large orders. But service reports so far show that the fear was unfounded and that the cost of maintenance is actually less than in the case of the wooden cars of lower capacity. The reports from one trunk line where large numbers of pressed steel cars have been in use give the cost of maintenance of 60,000 lbs. capacity gondola cars as \$35.40 per year, and that of pressed steel cars of 100,000 lbs. capacity as \$3.40. As these figures do not come from the Pittsburgh, Bessemer & Lake Erie, they may not be strictly applicable to that road. But if such an application should be made, it would show that the annual cost of maintaining the 600 pressed steel cars of the first order of that road would be \$5,040. If wooden cars of 60,000 lbs. capacity had been ordered in their stead, 1,000 cars would have been needed to carry the same net tonnage. The annual cost of maintenance of these cars would have been \$35,400, showing a saving in maintenance of \$30,360 per year.

In addition to this direct pecuniary advantage that is readily appreciated, there is that resulting from a smaller number of cars with the decrease of the axles and other parts requiring attention.

That these advantages are real and not theoretical, and that they are appreciated by the railroads, is evidenced by the rapidity of their adoption. During 1897, the first year that the pressed steel car was put on the market, 600 were sold. In 1898, 12,000 were sold, and during the nine months of 1899 ending September 30, orders have accumulated for \$15,000,000 worth of pressed steel parts and cars.

Roads that a few years ago were hauling four-wheeled jimmies of five tons capacity, have thrown them away and ordered pressed steel cars, and it is safe to predict that they will eventually supplant the 60,000 lbs. capacity cars now in general use. The limitation of their introduction lies with the purchasing capacity of a road and the ability of the track and bridges to support the increased wheel load. For, of course, the light rails and bridges suited to wheel loads of 5,000 lbs. cannot be expected to stand up to the work when the wheel loads are increased to 16,500 lbs.

It would be foolish to claim, and the builders would be the last to do so, that the pressed steel car of high capacity has touched the point of its highest and final development, and the final life of the car is still unknown. None have been long enough in service. Another uncertainty is the effect of the corrosion of steel, especially where large surfaces must be exposed with practically no means of applying an efficient protective covering. But in the matter of damage sustained in the case of an accident and the cost of the repairs thus necessitated, it has already been shown that the pressed steel car, after ordinary accidents, can be not only easily but cheaply repaired with tools commonly available, and that the cost compares favorably with that required by a wooden car that had gone through the same experience; while, when the car is so badly damaged that it has to be sent to the builders for

* Notes on the building of the Boston Elevated Railroad of which this bridge is an important part, were given in the Railroad Gazette, July 7 and Oct. 6, 1899.

repairs, the remains of a wooden car under the same circumstances would be fit only to burn in the ditch.

The steel car is winning on all points when placed in competitive service with the wooden car in the coal and ore traffic for which it has, thus far, been adapted, and that the builders have confidence in its future is shown by the fact that they have built a plant at Pittsburg capable of turning out seventy-five cars a day.

Prof. Ogden N. Rood on Variations in Normal Color Vision.

At the fall meeting of the National Academy of Sciences, held at Columbia University, New York City, beginning Nov. 14th, Prof. Ogden N. Rood of Columbia gave the latest results of experiments which he is conducting on color vision, by the use of his apparatus, the flicker photometer.

It is found that color blindness is, after all, only a relative term; for varying degrees of sensitiveness to different colors exist in persons whose vision is classified as normal, no two being alike.

Thus when tests were applied to eleven selected persons of so-called normal vision, mostly young men, it was found that they could be divided into two classes with regard to their perception of green, five in one class, and six in another. Of the five who were most sensitive to green, the sensitiveness to violet blue ranged from 87.8 to 95.8 per cent. that of green, and sensitiveness to red from 82.9 to 96.1 per cent. Of the six most sensitive to red and violet blue the percentage of sensitiveness to green ranged from 81.6 to 97.4 per cent., with slight differences also in their relative sensitiveness to red and violet blue.

In the ensuing discussion, Dr. Bowditch remarked that he was color blind to red, and that Prof. Rood had heretofore tested his vision by the old method of assorting colored worsteds, but the flicker photometer seemed to be much more reliable. He also suggested that these researches might aid in discovering the true theory of vision. Prof. Rood concurred in this opinion, and added that it was already known that the rods and cones of the retina have a general sensitiveness to luminosity, quite apart from their power of color perception. He also mentioned as an occasional cause of abnormal color perception, a yellow coloration of the crystalline lens, due to old age.

The Naval Architects and Marine Engineers.

The seventh general meeting of the Society of Naval Architects and Marine Engineers was held in New York City Nov. 16 and 17. There were business sessions at the house of the Society, 12 West 31st Street, being the house of the American Society of Mechanical Engineers. The paper which probably would have most interest to our readers was by Admiral George W. Melville, Engineer in Chief, U. S. N., Vice-President of the Society, on Causes for the Adoption of Water Tube Boilers in the United States Navy. Extracts from this paper follow. The paper was read in the absence of Admiral Melville by Mr. W. M. McFarland, recently of the Navy, now of the Westinghouse Electric & Mfg. Co.

Water Tube Boilers in the Navy.

Recently a change in machinery design has been made that at first glance appears radical—the general adoption of water-tube boilers for all new vessels of our Navy. I desire to show that the decision to use nothing but water-tube boilers in our future war vessels is a step in advance, and that it is a natural step toward the evolution of the perfect fighting machine.

In the first place, I want to state that water-tube boilers are bad in principle. They carry the pressure inside their weakest parts—the tubes. A failure in a tube is followed by the opening of a fault, sometimes to a dangerous degree. In a fire-tubular boiler, on the contrary, the pressure would continue to close a split tube. It is true that a failure of a boiler tube generally comes from pitting, where fire-tubular boilers generally have no such a great advantage as in cases of split tubes. Yet failure of tubes is the most common defect in all boilers, and a proper design would place the pressure on the outside of the tube. Water-tube boilers are, from their very definition, designed from a wrong principle, not only because of the direction of application of pressure upon the tubes, but also on account of the decreased amount of water in the boiler, of the increased difficulty of observing a leak, and of the decreased value of heating surface in water-tube boilers. For this reason, as an engineer, it is with some misgivings that I state that I consider water-tube boilers tactical necessities for warships.

Water-tube boilers are considerably lighter than those of the old type, and their effect upon ship design may be given as follows: Of two ships, having all other qualities identical, one fitted with cylindrical boilers and the other with water-tube boilers, the latter will be somewhat smaller and handier—will have somewhat less draught, and will cost less.

Limited, as we are, in the size of our warships by their draught, I think that the foregoing shows that for a maximum of fighting efficiency we must use water-tube boilers. The designing engineers of our

naval vessels are limited in weight and space. They save little or nothing in space perhaps, but they save greatly in weight if they adopt water-tube boilers. If these can be successfully operated on shipboard they must be used because of their decreased weight.

The Marietta's trip around South America, at the beginning of the war with Spain, was quite as successful as was that the Oregon. The first ship is fitted with Babcock & Wilcox boilers, the second with cylindrical boilers. No repairs were required to either set of boilers after the completion of the trip. The Annapolis is also equipped with Babcock & Wilcox boilers, and here, as on the Marietta, these boilers have been thoroughly successful. Indeed, a former Chief Engineer of the Annapolis has stated to me that the boilers of that ship were easier to manage in use and easier to maintain in a state of high efficiency than are cylindrical boilers. The Chicago has several Babcock & Wilcox boilers, and these have so far worked in a thoroughly satisfactory manner, no failure being reported under any circumstances.

The economical results from water-tube boilers were at first not particularly good. At present we get quite as good results from water-tube boilers of the latest design as from the best cylindrical boilers. The ratio of heating surface to grate surface has been kept up to at least 40, although we do not yet feel warranted in allowing as small grate surfaces in water-tube boilers as in cylindrical boilers. Water-tube boilers lose in efficiency when forced, especially those of the straight-tube type. Of course, this is not of very great moment to us in a naval vessel which is under forced draught only at maximum speed, but it is nevertheless a disadvantage.

The following table shows the relative economy of cylindrical and water-tube boilers:

	Annapolis	Marietta.	Newport.	Princeton.	Vicksburg.	Wheeling.
Type and number of boilers.....	(2 B. & W.)	(2 single-ended cylindrical.)				
Displacement, tons.....	1,000	1,000	1,600	1,000	1,000	1,000
Knots per ton of coal at most economical speed.....	26.38	22.77	18	19.6	21.25	16.6
Number of screws.....	1	2	1	1	1	2
Grate surface, sq. ft.....	93	94	78	78	73	60
Heating surface, sq. ft.....	3,620	3,661	2,524	2,524	2,524	2,508

The increased grate surface we have required with water-tube boilers will be a positive advantage to our ships' steaming qualities. I consider that sustained sea speed depends largely upon the grate surface. Heating surface, of course, must be provided, but I should prefer an excess of grate surface to an exceedingly high ratio of heating surface to grate.

Up to this time we have had no trouble from salt water or grease in water-tube boilers. Indeed, we could hardly be more troubled by salt water with this type of boiler than we have been with cylindrical boilers. We suffered severely in our short war with Spain from dropped furnaces in cylindrical boilers. I do not think that a properly designed water-tube boiler will give more trouble from the use of impure feed water, such as sometimes we must have at sea, than any other boiler. I do not think tubes more liable than furnaces to fail from a deposit of scale. In any event, the evaporating plants of all our ships are being made adequate to give fresh feed water. The only danger of salt water in the future should come from leaky condensers.

I would naturally come now to a discussion of the claims of the adherents and opponents of water-tube boilers. You have all heard these arguments and it seems almost useless to go over them. I shall simply state what I believe to be the advantages and disadvantages of water-tube boilers compared with cylindrical boilers.

Advantages.	Disadvantages.
Less weight of water.	Greater danger from failure of tubes.
Quicker steamers.	Better feed arrangements necessary.
Quicker response to change in amount of steam required.	Greater skill required in management.
Greater freedom of expansion.	Units too small.
Higher cruising speed.	Greater grate surface and heating surface required.
More perfect circulation.	Less reserve in form of water in boiler.
Adaptability to high pressures.	Large number of parts.
Smaller steam pipes and fittings.	Tubes difficult of access.
Greater ease of repair.	Large number of joints.
Greater ease of installation.	More danger of priming.
Greater elasticity of design.	
Less danger from explosion.	

A saving in space has been claimed for water-tube boilers, but I do not find this claim sound when account is taken of the increase in grate and heating surface necessary in water-tube boilers to ensure satisfactory working, and because of small units the space for accessibility is increased rather than diminished. The fact that water-tube boilers raise steam quickly is of the greatest advantage.

The higher pressures possible with water-tube boilers give us smaller and safer steam pipes and better valves. It decreases the size of the fittings and the difficulty of tracing the labyrinth of a ship's piping. It increases the efficiency of the engines. The introduction of compound engines forced us to use cylindrical boilers. In the same way the use of quadruple expansion engines necessitates, for economy, the use of water-tube boilers.

But the quick steam raiser is, because of that very fact, not so safe as its predecessor. Of course, nothing on a man-of-war is very safe in war time, but we want things as safe as possible, and the boilers are the keys to the situation in the modern battle-

ship. I think that safety in handling water-tube boilers may be assured by using skill in the fire-rooms. I have more than ten years' successful experience with water-tube boilers on which to found this opinion, and I submit that the boilers, placed as they are behind the heaviest armor and below the thick protective deck, are, at the worst, the safest apparatus on a battleship. If we can make them work well we would do wrong to refuse to use water-tube boilers on our ships.

I have always opposed the use of boilers containing screw joints in contact with the fire, and have attempted to secure boilers having no cast metal in the pressure parts. Cast steel is not yet good enough to put between 300 lbs. of steam and our firemen. I believe in straight tube boilers as being easier of examination and repair than bent tube boilers. I believe in large tube boilers for the same reason and because the tubes are thicker and have more margin for corrosion. I believe in boilers having as few joints as possible. Water-tube boilers must have freedom of expansion of the various parts, and the simpler the boiler the better. It should not be necessary to introduce reducing valves between the boilers and the engines to secure a steady steam pressure at the latter, nor should it be necessary to have automatic feed arrangements to ensure steady water level in the boilers. To be successful a boiler must be easy of repair. Lightness is a natural attribute of all water-tube boilers, but it is not wise to go too far in this direction. The ratio of grate surface to fire surface occupied for the complete boiler plant must be as large as possible. The units should be large, the grates short and not too wide. The passage of gases should be sufficiently long to ensure economy. These gases should be well mixed before entering the spaces between the tubes for the same

reason and to prevent smoke. The circulation of the water in the boiler must be free. Tubes should not be too long and the fire rooms must always be sufficiently wide to provide for free withdrawal.

In the meantime, all that I have to say is that the use of water-tube boilers has been definitely decided upon for our naval vessels, because water-tube boilers give tactical advantages of great moment, and because, with care in the selection, manufacture, and management of water-tube boilers, other disadvantages may be neutralized.

In the discussion Mr. Horace See maintained that the water-tube boiler is not only handier for naval vessels but actually safer than a fire-tube boiler, this being quite contrary to Admiral Melville's opinion.

Mr. Dickie, of the Union Iron Works, of San Francisco, considers that the water-tube boiler has yet to be made which can take the place of the Scotch boiler. Ten years ago he made 21 designs for water-tube boilers, 16 of which have been patented since and none of which are good. He doubts the superior performance of the water-tube boiler, even in the matter of quickly getting up maximum steam pressure, for the reason that with the water-tube boiler the time necessary to get the fire up to efficient condition would be longer than with the cylindrical boiler, neutralizing a part at least of the advantage of the water-tube boiler in raising steam quicker. He objected to the use of reducing valves and contended that the boiler, in so far as possible, should be under the working pressure of the engines.

Mr. J. J. Woodward, Naval Constructor, now stationed at Newport News, pointed out that the change in stability of the ship must be considered. The position of the center of gravity of the mass of the water will change more widely and frequently than could be the case with a cylindrical boiler.

Mr. Platt, of John Platt & Co., American representatives of Thornycroft, agreed that the ideal water-tube boiler has not yet been made. For marine service the best water-tube boiler would have large, straight tubes. In recent examinations of English warships he had found that even their straight tubes were seriously deflected after heavy service.

Mr. Du Bosque, of the Pennsylvania Railroad, spoke of the use of water-tube boilers for ferry-boats in New York Harbor, a number of which are now in service. They seem to be particularly adapted to this service because of the fact that the generation of steam can be more accurately controlled, and this is an important matter when, as is the case in ferry service, the craft is lying in the slip 25 per cent. of the time and the runs are very short.

Coaling Vessels at Sea.

Mr. Spencer Miller, of the Lidgerwood Mfg. Co., read a paper on "Coaling Vessels at Sea." He described first various apparatus which has been tried in different countries, and then described particularly his own system, which has been installed by the Lidgerwood Mfg. Co. on the U. S. collier Marcellus. An abstract of the description of this mechanism follows:

It is proposed, with this device, for the warship

to take the collier in tow, or the collier to tow the warship, leaving the distance between ships about 300 feet. The warship to receive the coal will erect a pair of shear poles on its deck, which, secured by guys, will support a sheave wheel and a chute to receive the load. The collier is provided with a specially contrived engine located after the foremast, having two winding drums. A steel cable, $\frac{3}{4}$ in. diameter, leads from one drum to the top of the foremast, over a sheave, thence to the sheave on the warship, back to another sheave on the top of the foremast, thence to the other drum. This engine gives a reciprocating motion to the conveying rope, paying out one part under tension; a carriage secured to one of the parts passes to and from the warship, its load clearing the water intervening. A carriage of special form is provided with wheels which roll on the lower part to the conveying cable, and grip slightly but sufficiently the upper part of the cable. This carriage will carry bags of coal 700 to 1,000 pounds. As soon as the bags are dropped, the direction of the rope is reversed and the carriage returned to the collier. The instant the load is hooked on, the direction of the ropes is again reversed.

The engine is of peculiar construction. It runs practically all the time in one direction, its speed being varied by the use of the throttle. The drum near the foremast is provided with friction mechanism, so that it is capable of giving to the rope a tension anywhere from 1,000 to 4,000 pounds. This drum is operated by a lever. The other drum is of special form, employing two dry metallic surfaces in contact. This drum is adjusted so that it will slip under any strain exceeding, say, 3,000 pounds. It may be adjusted while the operation is going on, the tension being increased if the load sags too much, and diminished if the deflection is unnecessarily small. The forward drum will be referred to hereafter as the 4,000-pound drum, and the other as the 3,000-pound drum. When the engine is running, the tendency of both drums is to draw both parts in, one to the extent of 4,000 pounds, and the other 3,000 pounds. The effect, therefore, is for the 4,000-pound drum to prevail and overhaul the 3,000 pound resistance, and it is this resistance that sustains the load in its transit between the two boats. Through the co-operation of the two drums the conveying distance between the two boats is compensated for and a practically uniform tension sustained during the transit of the load. If the points of support on the two ships approach each other (during the transit of the load) the effect will be that the drum pulling 4,000 pounds will take up the slack so produced, and the 3,000-pound drum will temporarily cease slipping, or at least the slip will be reduced. If, now, the boats pull apart, the 3,000-pound drum will simply slip the faster. All that is necessary, therefore, in the operation of this machine is to see to it that the speed of transit is in excess of double the speed at which the two boats come together.

After the load is dumped at the warship the operator of the engine releases the friction lever on the 4,000-pound drum, thus reducing the tension on the lower part to some point considerably below 3,000 pounds, whereupon the 3,000-pound drum acts to haul in rope, and thus returns the carriage to the collier.

The speed of conveying is about 1,000 per minute, consequently the load will be taken from the collier and deposited in the warship in about twenty seconds.

Other papers presented were: "Overhead Cranes, Staging, etc., in Shipyards," by James Dickie, Superintendent, Union Iron Works, San Francisco; "Progressive Speed Trials of the U. S. S. Manning," by Prof. C. H. Peabody, Massachusetts Institute of Technology; "Suggestions as to Improved Appliances for Launching Ships' Boats," by John Hyslop; "Electrical Plants of the Battleships Kearsarge and Kentucky," by Naval Constructor J. J. Woodward, U. S. N.; "Increasing Complication in Warships, with Suggestions of Simpler Arrangements," by George W. Dickie, Manager Union Iron Works; "Notes on Sheathing the U. S. S. Chesapeake," by Naval Constructor L. Bankson, U. S. N.; "Designs for the Denver Class Protected Cruisers," by Chief Constructor Philip Hichborn, U. S. N.; "Novelties in Ship Fittings," by Assistant Naval Constructor R. M. Watt, U. S. N.; "Technical Considerations Involved in Torpedo Boat Design," by Lieut. A. T. Niblack, U. S. N.; "Beam Formulae Applied to Stiffened Bulkheads," by H. F. Norton; "On the Action of the Rudder," by Prof. W. F. Durand, Cornell University.

The report of the Secretary-Treasurer showed a total membership now of 573, assets of \$13,935 and no liabilities.

The following officers were elected: President, Clement A. Griscom; first Vice-President, Rear Admiral Sampson; Secretary, Naval Constructor Francis T. Bowles, of the Brooklyn Navy Yard, re-elected; Executive Committee, Francis T. Bowles, H. T. Ganse, Harrington Putnam, Lewis Nixon, Edwin H. Stevens and Clement A. Griscom, ex-officio. The following vice-presidents were re-elected: Francis M. Bunce, Charles H. Cramp, Frank Y. Fernald, Philip Hichborn, Charles Loring, George W. Melville, George W. Quintard, Irving M. Scott and Edwin A. Stevens.

On Friday evening a banquet was held at Delmonico's. Speeches were made by Charles Fowler,

M. C., of New Jersey; Mr. George W. Dickie, of the Union Iron Works; Mr. Walter McFarland, now of the Westinghouse Electric & Mfg. Co.; Mr. W. L. Capps, U. S. N., who has just returned from the Philippines, and Mr. C. A. Moore.

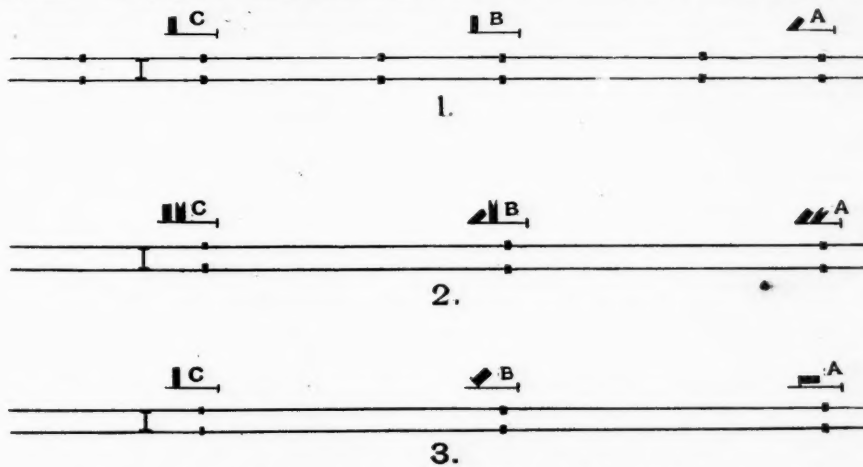
Possibilities of Three-Position Signaling.*

By Frank Rhea.

The first question to be decided in considering this subject is: Can a positive and characteristic indication be given with a signal in three positions?

In answering in the affirmative I would refer to the requisites of installation for telegraph block signals, as formulated by the American Railway Association, where occurs the following requisite: "The signals shall be of prescribed form, the indications being shown by not more than three positions." This clearly indicates that these gentlemen, after exhaustive examination, decided that distinctive and characteristic indications can be given in each one of the three positions. However, in referring to the requisites for manual controlled signals, automatic block signals, and interlocking signals, we find the requisites in each case limit the signals to two positions. Were these requisites not thus limited to conform to already existing practice rather than to debar the use of three positions, if thought desirable? Is this limitation to two positions wise? And by so doing, are we utilizing to the greatest extent and deriving the greatest possible benefit from the signals—the number of which we are constantly increasing each year?

Let us first consider the possibilities of three-position signals, used to give the indications with an automatic block system. As automatic block signals are installed to-day, we are limited to two systems. The first, shown by sketch No. 1, is known as "The Over-Lap System." The second, which is shown by sketch No. 2, is "The Home and Distant Signal System." The proposed "Three-Position Sys-



Proposed Arrangement of Three-Position Semaphore Signals.

tem" is shown by sketch No. 3. As is well known, the "Over-Lap System" is composed of home signals only, and the indications so arranged that a train entering block A, throws signal A to danger position. The train passing into block B, throws signal B to danger, and still holds signal A in the danger position, until the rear of the train has passed a prescribed point beyond signal B, when it releases signal A, allowing it to go to the clear position, but still holds signal B in the danger position—and so on through each block, in passing over such a system.

The home and distant signal system consists of a home and distant signal placed on the same mast. A train entering block A (sketch 2) throws home and distant signal at A to the danger and caution positions, and when the rear of the train has passed out of block A, home signal A is released and goes to the clear position, but the distant signal A still remains in the caution position. The train in passing into block C, throws the home and distant signals C, to the danger and caution position, and when the rear of the train has passed off to Block B, home signal B will be released and go to the clear position, when distant signal A will also indicate clear.

The proposed system, as shown by sketch No. 3, consists of one home signal for each block. The train entering block A throws signal A to danger position. The train entering block B throws signal B to the danger position, and when the rear of the train has cleared block A, signal A assumes the middle or caution position (showing a green light at night) indicating that block A is clear but that home signal B is in the danger position. The train entering block C throws signal C to the danger position, and when the rear of the train has cleared block B, signal B assumes the middle or caution position (showing a green light at night), and signal A assumes the clear position—indicating that block A is clear, and that signal B is either in the caution or clear position; thus giving the completeness of

information that is given by the home and distant signal system, but requiring the reading of but one signal only at a time, for this completeness of information.

Let us now compare the merits of the three respective systems. It is generally admitted that the principle of the over-lap system has not proven satisfactory, and that by using it you either retard your speed of trains, which limits the volume of business to be handled over your tracks, or, if you do not so retard your speed of trains, that you do not derive all the benefits and safeguards which it is possible to obtain from a system of automatic signals. This is due to the fact that you do not have any caution or advance indication of the condition of the next block in advance. By this I mean that you can get a clear signal at one block, and an absolute stop signal at the next block.

The home and distant signal system and the three-position system give the same completeness of information, as they both show the condition of two blocks in advance. I think it will be readily admitted, however, that the three-position system gives its indications more simply and to the point, and that it is easier for the train men to read and interpret these indications quickly. Other things being equal, the simpler apparatus or method is always the best. With the three-position system we carry out our present practice of telegraph block signaling as provided by the American Railway Association rules to permit of permissive block signaling. In addition, we do not violate, as we do with the home and distant signal system, one of the admitted principles of interlocking signals—of having two signals show clear, on the same mast, at the same time, for one track. By giving an engineman a caution signal only, when the next block indicates "stop," is the most rational and forcible manner of emphasizing the fact that this is the condition at the next block—more so than any other combination which can be given that includes an all clear signal; and when

this condition does exist, the block, in approaching a home signal at danger, should be regarded as a slow speed movement, and only a slow speed signal given.

From an economical standpoint, the three-position system has the advantage of considerably less cost in expense of installation over the home and distant signal system; in fact, the cost of installation is only slightly increased over that of the over-lap. From a maintaining standpoint, it is probably considerably the cheapest of the three, and from an operating standpoint, the expense should be exactly the same as the over-lap system, with the same number of signals, and decidedly less than the home and distant signal system. It will be appreciated where this occurs from the fact that we have but one-half the lamps that we do with the home and distant signal system, and when it is considered that it costs something like \$12 a year, in labor and oil, to operate one lamp.

Let us now consider the three-position signal used in connection with interlocking. It has become the generally prevailing practice to use two arms on all high, home, interlocking signals, where there is a high speed route and one or more slow speed or diverging routes—the top arm governing the high speed route, and the lower arm all the slow speed or diverging routes. The proposed arrangement of the three-position signal would govern the high speed route when the signal is in the vertical position—or shows a white light at night. When the arm is in the 45-degree position—or shows a green light at night—it would govern the slow speed, or diverging routes. With this method of signaling we would make a characteristic difference between the high speed route and the diverging routes, and would carry out in practice the giving of a low speed or caution signal, when a movement is to be made at a low speed. At present the usual practice is such that, if one of the lights goes out at night the engineman has no means of ascertaining when he is approaching a signal whether he is receiving the indication for the high speed route or the low speed

*A paper presented before the Railway Signaling Club at Boston, November 14.

route, except as he may be able to remember at which heights the respective signals are located.

The three-position signal used in connection with interlocking has decided advantages in the way of economy, as has the three-position automatic system. It would require only one-arm poles, which in itself would be a considerable saving. A three-position signal, however, would have to be operated with pipe connections, but as it is the practice on a number of roads to use pipe-connected home signals, this would still effect the saving of the connections to the lower arm. This of course would mean proportionately fewer number of connections to be maintained, and care of the smaller number of lights would mean, in its turn, a corresponding saving.

A Typical Box Car.

At the October meeting of the Western Railway Club the topical subject for discussion was: "What Would be the Advantage to Railroads in Adopting a Box Car of Typical Inside Dimensions?" Mr. G. W. Rhodes opened the discussion and extracts from his remarks and from those of others who took part follow:

When I first met with some of the American Railway Association's Committee on a Standard Box Car, I was surprised at their hopefulness as to the end, and also I was surprised that they did not expect to accomplish anything immediately, and talked of two or three years to bring about results. Our committee has already had two or three meetings. We issued a circular asking for information about the dimensions of box cars. The answers that came in, at first sight, one might say, were not very satisfactory. The committee proposed a typical car, giving figures, and 81 roads, representing 348,708 cars, reported in favor of the committee's proposed standards. Fifty-seven roads, representing 482,568 cars, reported unfavorably on the committee's proposed standard, but a curious thing showed up in the reports of the 57 roads that reported unfavorably; they, at the committee's request, made their own recommendations, and they reported forty or fifty different kinds of cars, which varied, perhaps, 1 in. or 2 or 3 in. in interior dimensions. This is the hopeful side, to the committee. We felt that there was a little misunderstanding on the part of the railroads as to the scope of the committee's work and the intention of the committee's work, and our committee believed if we could, in some way, get this question before the mechanical men who have the designing of the cars, and get them to co-operate with their operating officers, that we might easily reconcile these differences and come to a standard car.

The committee, in starting out, did not propose to define just how long the car shall be, just how high it should be, or just how wide it should be. It confined itself to proposing interior dimensions. I believe it goes without saying that the most economical box car a railroad company can build is one that has the greatest width allowable on the lines of the railroad company that is building the car, and next is the one that has the greatest height allowable on the lines of the railroad company building the car. Now, the committee has endeavored to get for the railroads these figures, and the outline that they propose is this: All the figures used by the committee are inside dimensions.

The proposed inside height, from the top of the floor to the bottom of the carlin immediately over the plates, is 8 ft.; the proposed width between linings is 8 ft. 6 in.; the proposed length between linings is 34 ft. This gives a car with contents of 2,312 cu. ft., and per foot, 68 cu. ft.

As soon as these figures were proposed, or talked about, and some arguments made from the utility standpoint, the New York Central said they thought they could change their standards so as to comply with the proposed typical car. The General Manager of the Atchison had a number of cars to contract for, and he told the committee, at our last meeting, that he had instructed that the interior dimensions conform to the proposed typical car. The Pennsylvania Railroad has this matter now under serious consideration. Now, the question comes up here as to why it might not be possible for the lines in the East and the lines in the West to agree upon a typical car. In the first place, the lines in the East, many of them, have double track roads. Out in the West we are getting into the same condition. All the roads with single tracks have their yards, and they are limited to their distances from center to center, and we ought to use cars as wide as is safe to do and pass over our center to center distance. On the roads West, if my information is correct, the distance between centers has usually been considered 14 ft., whereas, in the East it is about 12 ft. At the present time the Burlington road has changed its standard double track road from 14-ft. centers to 13-ft. centers. It realizes that 13 ft. is plenty wide enough for all conditions of service, and that the economy is great in constructing double track with 13-ft. centers in place of 14. In fixing minimum rates, some form of typical car has to be used. The present object is to get a typical car built which will be regarded as the most economical and cheapest car for all railroads to operate. It is hoped that, by getting the mechanical men interested in this very important question, its solution will not be so far away as may at first appear.

Mr. S. T. Crapo (F. & P. M. R. R.): You talk about carloads, the traffic men talk about carloads; the revenues of our railroads are based either on carload rates, which are given at great discount, or on less than carload rates which are higher. The fact is, men wonder what a carload is. We have all heard of the boy that in talking about cars said, "Little car, don't cry; you'll be an elevator by and by," and that is what the traffic men are asking—is it a 28-ft. car, or is it an elevator on wheels? They call them both a carload, and there is no distinction.

Now, it is for you practical gentlemen to first decide what, as Mr. Loree lately put it in our meetings, is the most economical vehicle of transportation. That is

a technical measurement. First, you have to get hold of an economical vehicle of transportation; then the traffic men have got to use that economical vehicle of transportation. A proper regulation of this matter will save greatly in light loading and empty mileage, and in all the other difficulties we have been meeting in having to get special cars for special purposes; we certainly can do away with drop floors and all kinds of abnormal construction that are now forced into the designs of cars. Mr. President, it is the purpose of the Committee on Standard Dimensions of Box Cars of the American Railway Association, to determine the dimensions of a box car which shall be, all things considered, the most economical vehicle of transportation.

The standard box car must be of such dimensions as shall make it available for the general use of the railroads of the country. Accordingly, the two most important dimensions—the height and width—will be fixed, not by theory, but by the physical limitations of important railroad clearances. The length will be determined by the requirements of ordinary stowage, and by the matter of economy in construction, maintenance and operation. Therefore, I believe, if mechanical organizations like the Western Railway Club take the matter up earnestly it will not be difficult to define the standard dimensions.

But there are now in existence a large number of cars exceeding the contemplated standard dimensions, many of which have a lowered floor plane and many other abnormal features. They are not economical vehicles of transportation. It is therefore necessary for this committee not only to determine the dimensions of the standard car, but also to make some provision which shall encourage the railroad company and the shipper alike to construct and use the standard car, and, at the same time, prevent the abuse, while still permitting the use of the abnormally large cars now in existence.

The pressure to build an abnormal car is largely the outgrowth of freight classification rules. The classification committees, however, are not alone at fault. They have repeatedly asked for a standard car upon which to base rulings. The chairman of the official classification committee, in a letter, says: "The minimum carload weights in effect under the official classification are based, as nearly as possible, upon a fair average of the actual weights of the various articles that can be loaded in what may be considered an ordinary car." But what is an "ordinary" car? In another letter the same officer complains that in some cases a car contains "1,309 cu. ft.," in others "2,700 cu. ft." Again, the chairman says: "If they (the cars) were uniform in length and capacity it would be an easy matter to provide minimums on the various classes of freight." If, therefore, the "standard car," or the "most economical vehicle of transportation," can be determined and agreed upon, then the classification committee should consider this the "ordinary" car, and adopt it as the "car unit" or basis of measurement for carload rates.

The difficulties of the classification committees lie chiefly in dealing with "light and bulky" articles. There are approximately 2,700 articles provided with carload rates in the official classification; 439 of these may be denominated as "light and bulky." The great variation in the size of cars has made it impossible to prescribe a minimum weight which has any direct connection with the amount which can be actually stowed in a car body. To protect the revenue it has become the policy to name minimums in excess of what can be loaded—then in reality the rate is based, not upon the theory of weight, but upon the theory of cubic capacity; and in such a case the official classification schedule is a cubic capacity schedule, which is incomplete and poorly defined, and which becomes more favorable to the shipper the more overgrown the car becomes. For example, the average actual weight of grain cradles in a 30-ft. car is 2,000 lbs.; the official classification minimum is 20,000 lbs. (fifth class). It would require a car 300 ft. long to carry the minimum weight. The larger the car the more cradles can be loaded and the cheaper the charge per carload. With this commodity, therefore, there will be an undiminished pressure on the part of the shipper to increase the size of the car until the 300-ft. limit is reached. The same principle applies generally in the loading of all light and bulky articles, the demand of the shipper for large cars continues—the railroad company, in the face of sharp competition cannot resist—and the large car evil grows greater and will continue to do so until some radical action is taken to remedy it.

As soon as the classification rulings in effect nullify the weight basis and substitute the cubic capacity basis, then the following dilemma presents itself to the classification committees:

(a) To protect the revenue of the large cubic capacity cars which they have encouraged and brought into existence.

(b) To enable roads which have no large cars, or cannot conveniently supply large cars, to share in the business.

In the attempt to solve this, the classification committees have all been forced to make an effort to define a "car unit." The several committees have handled this upon different theories and with varying success. The different "car units" now in effect in various parts of the country I will now give, using such data as they have at hand. It is expected to give this point further investigation, and any information or corrections in regard to the practical operation of these rules is solicited. —[We omit for want of space the various rules and results cited.—Editor.]

When the most economical vehicle of transportation is determined, all rules should be to the end that such standard box car should be given the greatest possible use and the best possible treatment by the shipper. Exceptional commodities will need exceptional cars, but the rule and the penalties should be such as to make the tendency of all railroads and all shippers toward the use of the most economical car.

A successful rule of freight classification must bring about the following results:

(a) The discouragement of the building of cars larger or smaller than the standard.

(b) The least unnecessary car movement; which will follow when the minimums are affixed so as to be most favorable to the standard car. Such cars will then not only be in the greatest number, but also in the greatest demand.

(c) The placing of a penalty upon loose and wasteful stowing on the part of shippers.

(d) The reduction of clerical labor to the lowest degree possible.

(e) The provision of an easily understood method of communication between all railroad employees and shippers.

The following suggestions are given for consideration:

1. Decide upon the height, width and length of a standard box car, the exact dimensions of which shall be determined by features of economy in transportation.

2. Readjust the minimums for light and bulky articles which do not load to the minimum, to the basis of the "car unit" of the standard box car, but so that the charge to the shipper shall not be increased. A method to accomplish this is suggested below:

Ascertain a sufficient list of car numbers which have been used for the actual shipment of the various light and bulky articles; obtain the cubic capacity of these cars; make a table:

Box Car Number.	Cubic Foot Capacity of Car.	Minimum Weight of Commodity Under Consideration.
A. B. R. R., 100.....	3,000 cu. ft.	20,000 lbs.
C. D. R. R., 200.....	4,000 cu. ft.	20,000 lbs.
E. F. R. R., 300.....	3,500 cu. ft.	20,000 lbs.
H. I. R. R., 400.....	2,500 cu. ft.	20,000 lbs.
J. K. R. R., 200.....	2,000 cu. ft.	20,000 lbs.
Total.....	15,000 cu. ft.	100,000 lbs.

Divide 15,000 cu. ft. into 100,000 lbs., and it would show that the result of the present classification for the commodity under consideration was an allowance of 6% lbs. to the cubic foot. If, therefore, the cubic capacity of the standard car should be 2,400 cu. ft., by multiplying this amount by 6% the minimum of the commodity under consideration, or 16,000 lbs., would be obtained, and this would make no change of charge to shipper.

3. Rule that cars smaller than the standard shall have the same minimum as the standard car (it being expected that these cars will soon disappear, and while in the service can be kept fully employed in handling heavy traffic, which does not require cars of large cubic capacity).

4. Apply the theory of increasing minimums to all cars, the dimensions of which shall exceed the standard. This will protect the revenue of the large cars, and, from the standpoint of the railroad, offset the reduction made above in "2." Let the minimums increase in a ratio slightly in excess of the ratio of increase in cubic capacity, in order that the construction and use of abnormally large cars shall be discouraged.

5. Stencil prominently all box cars in classes, as A, B, C, D, E, etc., so that there may be provided a method for quick and intelligent description.

6. Publish in the classification a table of increasing minimums, as follows (the figures given being hypothetical, for purposes of illustration):

Class.	Length.	Cubic Capacity.	Minimum.
A (standard)....	34 ft. or less.	2,200 ft. or less.	20,000
B.....	34-36 ft.	2,201-2,330 ft.	21,500
C.....	36-38 ft.	2,331-2,460 ft.	23,000
D.....	38-40 ft.	2,461-2,590 ft.	24,500
E.....	40-42 ft.	2,591-2,720 ft.	26,000
F.....	42-44 ft.	2,721-2,850 ft.	27,500
G.....	44-46 ft.	2,851-2,980 ft.	29,000
H.....	46-48 ft.	2,981-3,110 ft.	30,500
I.....	48-50 ft.	3,111-3,240 ft.	32,000

If a classification of a car in accordance with its length, is higher than its classification in accordance with its cubic contents, or vice versa, the car shall be placed in the highest class required by either.

Mr. C. A. Schroyer (C. & N.-W. Ry.): The effort of the mechanical department has been very largely to build the car that the traffic department wants. This question has been introduced a number of times in the Master Car Builders' Association, but we have doubted whether the adopting of a standard size of box car came within our province. The result is, nothing has been accomplished in that direction, but I assure you the mechanical departments of the roads will hail with joy the establishing of a uniform size of car, if the other departments are willing to continue that car as a standard.

I have no means of knowing to what extent the cost is increased to-day for maintaining the various sizes of cars which we must do. The sizes and quantities of materials are very largely increased because of this fact. It is an everyday occurrence that we are called upon to cut timbers to shorter lengths, to dress them down narrower and thinner, because of these conditions. The amount of money that is lost in so doing, the delay that is occasioned, is of such character that it would be a great measure of economy, and quite a saving of time, if it were possible for us to adopt a typical or uniform size of box, stock, gondola and flat cars.

Mr. Robert Miller (Michigan Central R. R.): Some 20 years ago our cars all carried 10 tons. They have grown from 10 tons up to 60, 80 and 100 tons. Our road runs to one of the greatest furniture manufacturing cities in the State of Michigan. Some years ago one company said that if I would put on a car of a certain pattern for their work, they would be satisfied, and take every car. Well, we built a number to conform to their wants, perhaps a dozen, but somebody discovered they were not just right and they were built a little larger. They kept growing from that until they reached 40 ft. Then our President said, "We will stop there; we won't build any larger." Well, we had to build them 45 ft. This morning I saw that the Chicago & North-Western has a car 50 ft. long, and I feel that a remark of a friend of mine applies in this case. He said, "If there is one thing that the Lord does not know, it is what a boy will do next."

Mr. Delano: As to the suggestions of the committee of the American Railway Association, about a car 34 ft. inside, while I think that a 34-ft. car, as generally understood, is about the right dimension for a typical car, yet I want to ask if this committee has in mind the fact that a 34-ft. sill will not make a car 34 ft. long inside? In buying timber, the merchantable lengths of timber vary with each 2 ft.; if you cannot build a 34-ft. car with 34-ft. sills you must buy 36-ft. sills, and, hence, waste, perhaps, 18 in. of material. I merely mention this point, because if we are really considering the most economical vehicle of transportation, we must consider the construction and the maintenance of it.

Mr. Marshall: Mr. Rhodes has said that the committee of the American Railway Association spoke about the clearances of the Pennsylvania Railroad. I would like to ask if there are not other roads whose clearances must be considered. We have been looking into the matter of these standard dimensions with a view of determining what we would do in new box cars, and we find that there are several roads whose limits we have now reached; and if we should consider a car anything like 8 ft. 6 in. wide inside, and 8 ft. high in the clear, it apparently would not clear on some portions of the Pennsylvania Railroad, New York, New Haven & Hartford Railroad, and some others. We are not through with our investigations, but it is quite a

work has been completed, it has been found that the concrete hardens quickly and apparently makes as substantial a foundation as when placed out of water. This is largely accounted for by the even distribution of the concrete, which is made possible by the use of this bucket. The importance of this invention will be readily understood and for concreting under water it promises to find an extended use. The general method of working the bucket should be made clear from the following explanation, which refers directly to the design for general use as covered by the patents on the invention.

operator, the attachment shown in Figs. 1, 2 and 4 are used. A single spring latch, E, wide enough to engage both leaves, is mounted on the walls of the bucket, a detail of which is shown in Fig. 4. Over this the doors pass upward, but cannot pass downward again until the latch is released. The rock shaft, k, mounted as shown, operates this latch, having an arm, f, which is connected by a link, g, with the operating lever, h, to which a trip rope is attached.

Signalling Underground Railroads.

The signalling of the deep-level electric railroads does not differ in principle from signalling on an ordinary surface or underground line, but the conditions under which a signalling plant has to be installed on a deep-level tubular line necessitate variations in detail. The subject being a topical one just now, as two deep-level railways are nearly approaching completion and others are under construction in the Metropolis, a representative of Transport sought information from the firm of Evans, O'Donnell & Co., contractors to both the City and South London and the Central London.

For the present, Moorgate Street is to be the City terminus of the City and South London system. The plan of the station lines adopted is the same as that employed at the company's present terminus at King William Street, namely, that each of the two platforms should be used for the arrival and departure of trains, and a "scissors," or double crossing, is provided. This arrangement permits of incoming trains running to either platform, thus allowing one train to be in the station taking in passengers while another is arriving. This station is also provided with an engine siding at the end of one of the platforms.

The signal cabin controlling the movement of the trains at this station is built over the lines in the crown of the tunnel, supported on wrought-iron girders built into the brickwork. The number of levers in this cabin is twenty-six. At the Bank or Lombard Street Station the cabin is on the platform, and contains ten levers, the interlocking of which is much simpler than at the Moorgate Street cabin. The London Bridge Station has a similar cabin on the platform, and this contains fourteen levers. At the junction with the existing Borough Station, where this new extension joins the old line, new interlocking arrangements have been provided, and these work in connection with the existing station interlocking.

The tunnel signals, owing to the tunnel being only 11 ft. 6 in. in diameter, have to be of a special character, and this will be more readily understood when it is mentioned that there is only 1 ft. 3 in. in width in which to place the signal. A brief description of these peculiar signals is as follows: A cast-iron box, in the front of which is fitted a bull's-eye, is provided also with guides at the front edges of the box for a vertical sliding spectacle containing a ruby and a green glass. These spectacle slides are connected to the wires from cabins, and are provided with all necessary cranks, counterbalanced weights, etc.

All signals, both tunnel and semaphores, are lit electrically, and signals out of sight of the signalmen are also electrically repeated in the cabins. The electric locking is Spagnoletti's system, and the work has been carried out by Messrs. Spagnoletti and Crookes—sub-contractors to Messrs. Evans, O'Donnell & Co.

Foreign Railroad Notes.

Last May a permanent "Transportation Museum" was established in Budapest, which illustrates quite fully the development of railroad engineering in

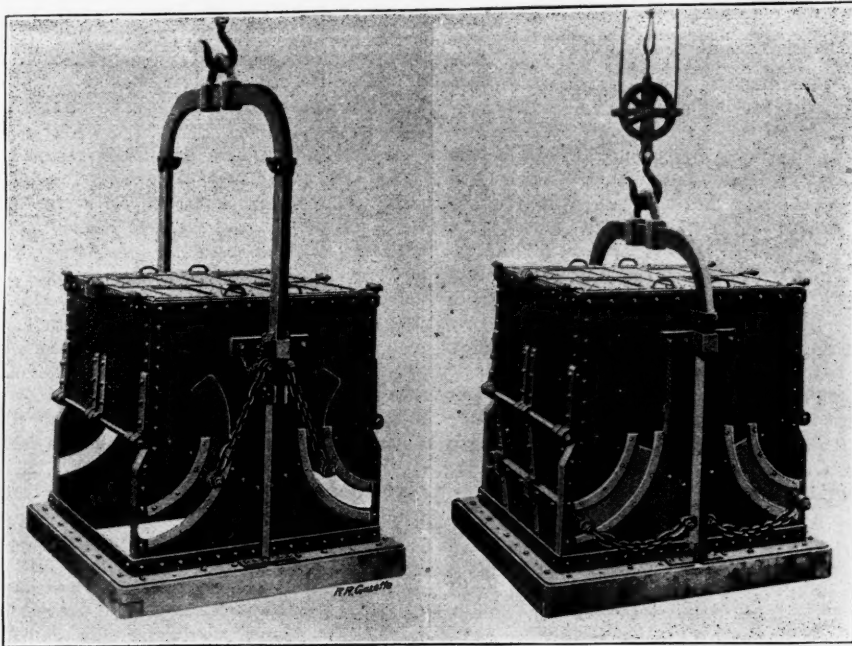


Fig. 6.—The O'Rourke Automatic Drop-Bottom Bucket for Concreting Under Water.

serious question, as we have no means of knowing whether the clearances quoted us will remain as they are, or will be increased in the future.

Mr. Crapo: Of course, the Equipment Guide gives a certain table of clearances, but the committee is anxious to have a fuller explanation as to what are the limiting clearances. The compiler of the Equipment Guide thinks he will be able to make his Guide more satisfactory if the actual clearances are given. They are given very roughly in the Guide now, but it will be a splendid thing, in building cars, to have them given fully.

The O'Rourke Dumping Bucket.

The drop bottom bucket, shown in the accompanying engravings, was recently patented by Mr. John F. O'Rourke, M. Am. Soc. C. E. His aim was to design a bucket which would discharge its contents with a certainty and at the same time overcome the chance of an accidental discharge. The bucket is designed to be used either as an automatic discharging bucket or as one to be dumped only at a desired moment by the operator. Another aim was to dispense with a trip rope when its use is undesirable, as in submarine work. These and other desirable features have been secured in this invention.

The design shown in the accompanying engravings, Fig. 6, has been used for about two months in building five large concrete piers at the City Island Bridge, New York City. The bucket here shown has many improvements over the first two which were built from the general designs, the details of which are shown in Figs. 1 to 5. One of the improvements is the addition of steel plates, covering the openings of the curved slots in which slide the ends of the bars to which the doors are bolted and to which the chains are attached. These plates prevent concrete from oozing out after the doors have been swung down and while the bucket is being raised. In this bucket, the doors swing their full width without going below the bottom of the bucket. In the lower part are strips of wood 4 x 6 in. which prevent the bucket from sinking into the fresh concrete previously placed. This is necessary owing to the great weight of the bucket and the concrete. The one here shown holds 2½ cu. yds., is 4½ ft. square inside and 5 ft. high and weighs empty about two tons.

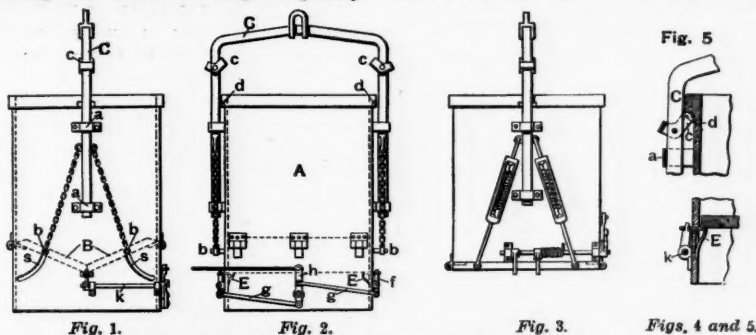
When the bucket touches the concrete already placed, the weight of the concrete and the bucket causes the doors to drop, which is made possible by the chain becoming slack. When the arms of the handle, to which the derrick rope is attached, are in their lowest positions, a catch prevents the handle from rising higher than in the position in the right hand view of the engraving, Fig. 6. When the bucket is swung around to be filled this catch is removed by a workman, the doors drawn up by the derrick rope and a pin inserted so as to prevent them from falling, and this pin is taken out as the bucket rises to carry its load to the desired place.

By the use of this bucket the work can be done as rapidly under water as on dry ground and where investigations have been made after some of the

Figs. 1 and 2 show the ends and front elevations of a bucket which can be used either as a self-dumping bucket or one which dumps under the control of the operator. The parts are shown in the position they occupy when the doors are closed.

The bucket consists of the body, A, and the doors, B, formed of two leaves which are hinged to opposite walls and form the bottom of the bucket. As shown in Figs. 1 and 2, the walls of the body extend below the doors to form an apron, while in Fig. 3 the doors are shown as hinged to the lower edge of the bucket. The ball, C, to which the hoisting rope is connected, is not fixed rigidly to the body, but is free to move vertically, being guided by the eyes, a, a. The ball is adapted to directly engage the body of the bucket and is also adapted to support the bucket and its contents through connection with the doors, B. For this purpose loose connections (as chains) are provided, as shown, between the ball and the doors, which are connected to the door by the pins, b, b, extending outward through the curved slots, s, s.

Assuming that the bucket is suspended in the air with the ball in the position shown in Figs. 1 and 2, and the bucket filled with concrete for use in submarine work, all the weight on the doors or bottom of the bucket is directly transferred through the chains to the ball. As soon as the bucket is lowered away and touches bottom, the hoisting rope is slackened, thus permitting the ball to descend and the doors to open. The ball descends until the dogs, c, pass the lip, when on hoisting, the dogs engage in the lip, permitting the doors to swing completely



The O'Rourke Dumping Bucket—General Design

downward, and discharge the load. If the apron is used as shown in Figs. 1 and 2, it is obvious that the door will drop as soon as the lower edge of the apron rests on solid bottom, while in the construction shown in Fig. 3, in which there is no apron, the doors will not be opened until the bucket is lifted from the bottom. In this case, means are provided to assist, if necessary, the downward movement of the ball by the springs there shown.

When the bucket is not used as a self-dumping bucket, but is wholly under the control of the

Hungary in samples of nearly all the rail patterns, models of bridges, stations, of 20 locomotives, and of 60 passenger and freight cars; also shop appliances, signal apparatus, etc.

The Northern Railroad of France has introduced the use of glass signs for its stations, etc., and for ordinances and other notices which it is necessary to have continuously posted up. These are made in one piece about 31 in. x 43 in. in size and the characters are printed in black on an opaline glass.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to improvements. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The armored train, as a war instrument, is getting a better trial in South Africa than it has ever had before. In our civil war the efforts to use such an arrangement were few and crude, hardly more than suggestions in fact, and no military operations that have happened since have seemed to lend themselves very well to the use of armored trains. Now, however, they are getting a good trial, and whether they come out of the campaign with their prestige diminished, as seems to be the case with the torpedo boat just now, or whether they prove to be even more useful than had been expected, is yet to be seen. As a war machine the armored train has some very obvious advantages, the first of which is its speed. This element alone permits its use for reconnaissance over far greater distances than could be covered by mounted men. It has the further advantage of being able to carry guns of some size, and also of being able to carry a considerable body of troops, and, finally, it can be armored against rifle fire. But the disadvantages are also great and obvious. The noise, and smoke and steam betray its presence. A reconnaissance with an armored train cannot be made quietly, and as it must work along a railroad line that is presumably provided with telegraph wires an intelligent enemy could announce its coming to any distance ahead. He could also destroy the track ahead of the train, and what is much more serious, he could put in mines to be exploded by percussion as the engine comes over them, or by electrical exploders after the train has passed, and thus the reconnoitering party may be caught helpless far away from support. Furthermore, it would often be easy to destroy the means of getting water for the engine. This device introduces great temptations to make long reconnaissances far in advance of support, but they must always be hazardous if the enemy is active and intelligent. Meantime, our cousins in South Africa have got a good chance to show what can be done with the locomotive as a war machine.

At the November meeting of the New York Railroad Club there was a remarkably useful discussion on the question of color blindness and the means of detecting it. Incidentally, the point came out that color perception is affected by fatigue. Perhaps we should not say that a tired man is any more color blind, strictly speaking, than the same man when he is fresh, but he cannot see anything so well, and there is a practical relation between acuteness of vision and color perception. Those who begin to feel the effect of age on their eyes know this very well from every day experience. All of this suggests a point which did not come up at the meeting, namely, the general physical fitness of the men to stand fatigue. For several reasons it is probable that some time the men who go into railroad service, at least into some branches of it, will be examined as carefully as recruits for military service. Railroads

ought not to train men for their work unless those men are likely to hold out. It is not worth while to throw away time and money educating men who are liable to fail physically before they have earned enough to justify the cost of their education. A railroad company has an investment in the young men whom it has trained up, just as the nation has in its young soldiers; but further than this the effect of the physical condition of the men on the safety of operation is even more important than this financial point. The legal liability of railroads for the physical fitness of such of their employees as have to do with the safety of operation will probably be a more and more important point in the future as the members of the "ambulance bar" get this idea more clearly in their minds. And, further, there is a whole train of responsibility, moral as well as financial, for accidents, which obviously the scientific railroad officer of the future is going to reduce to the smallest possible limit. It does not often happen that a flagman dies of heart disease when he is on his way back to flag a train, or that a man falls dead in the engine cab, and perhaps it would not be worth while to spend much energy in guarding against such remote chances; but even these chances do come in to increase the sum of the responsibility that a railroad takes in hiring men. The main point, however, is to get men who can do a normal day's work, and be fresh at the end of it, and beyond that the railroad company is bound to get men who can do more than a normal day's work and still have something left in them. In fact, emergencies are normal on railroads.

The United States Circuit Court of Appeals, Judges Harlan, Lurton and Taft, sitting at Cincinnati, has sustained the lower court (Judge Severens) in its decision, issued Feb. 3, 1898, prohibiting the Southern Railway and the Nashville, Chattanooga & St. Louis from charging higher rates on freight from New York, etc., to Chattanooga, than are charged to Nashville, 151 miles beyond. The complaint was first made about nine years ago, and the present decision sustains an opinion issued by the Interstate Commerce Commission Dec. 30, 1892. For several years the suit was allowed to lie untouched, waiting for the action of the Supreme Court on the Troy and Social Circle cases. The present decision is not final, as the railroads will undoubtedly appeal to the Supreme Court of the United States; but the people of Chattanooga are rejoicing over what the newspapers call a "great victory," and the lawyers seem to look upon the decision as of national importance. It seems likely, however, that the merchants of Chattanooga will receive no benefit whatever, and that those of Nashville will suffer no detriment. President Thomas, of the Nashville, Chattanooga & St. Louis, says that the rates from the East to Chattanooga will remain unchanged, but that (if the decision stands) the low rates to Nashville will simply be withdrawn. This will deprive his road of \$25,000 business yearly, but will not help Chattanooga. Nashville will receive its freight from New York by way of Cincinnati and Louisville, and, undoubtedly, at the same rates that have prevailed for years. Theoretically the withdrawal of the competition of the route from the East through Chattanooga would enable the Louisville & Nashville (the route through Louisville) to raise its rates, but there are other forces keeping the rates down, and there is no sign that an advance will be made. Moreover, the L. & N. owns a controlling interest in the N., C. & St. L., which makes a change unlikely. The importance of this case from a technical standpoint, as viewed by the lawyers, arises from the fact that in the other notable cases involving the fourth section of the Act to Regulate Commerce—the long-and-short-haul law—the courts, including the Supreme Court, have allowed the railroads a good deal of freedom in deciding whether competition justified them in disregarding the rule. In this case it is decided that the roads allowed themselves too much freedom in this respect. The actual competition at Nashville appears to have been that of the rail line via Louisville, but the argument presented to the court was based largely or chiefly on water competition; and the disparity between the Chattanooga rates and those to Nashville was very great. The court held that the water route—the Cumberland River—had been unduly magnified as a competitor.

Hard and Soft Rails Again.

A little time ago (Oct. 27, p. 747) we published some of the results of experience with high carbon, open-hearth rails on the Northern Pacific. After a year's service the high carbon (0.65 to 0.75) rails had lost in weight from 8 to 10 lbs. per rail, the low

carbon (0.35) rails from 19 to 20 lbs., which observation confirmed the Chief Engineer in the opinion that high carbon greatly reduces the loss of weight. A third weighing was to have been made shortly, and we shall hope to be permitted to publish the results of that.

For quite a number of years we have contended that hard rails would give more service than soft rails, not only as a matter of theory but as a matter of actual observation; but it is quite true that it is difficult to get records of accurate observations. We now have one that is interesting, not to say extraordinary. More than 10 years ago Mr. J. W. Post, Chief Engineer of the Netherlands State Railroads, published in the *Revue Générale des Chemins de Fer*, a note on the relative wear of hard and soft rails. This was drawn from observations on 16 German rails made from four different charges, two of which were hard and two soft. The carbon of the hard rail was 0.38, of the soft rail 0.21 per cent., and the ultimate resistance was 92,430 lbs. per square inch, and 71,000 lbs. per square inch, respectively. After 1,833 days of service these rails were reweighed and the loss of weight in case of the soft rail was 28 per cent. more than in case of the hard rail. Recently these rails have been again weighed and the result of 3,181 days' service is that the hard rails have lost 14 per cent. more than the soft rails. Summing the whole matter up, as a result of 5,620 days and of 91,459 train movements, the soft rails have lost 4 per cent. more of their weight than the hard rails.

Again, 22 Belgian rails were laid. These were made from six different converter charges, three being hard and three soft. Here the carbon was a little more than in the German rails, namely, 0.45 for the hard rail and 0.25 for the soft rail. The resistance in these cases was 106,000 and 73,000 lbs. per square inch. After 2,040 days' service the soft rails had lost 29 per cent. more than the hard rails, but in the next weighing, namely, after 3,635 days' service, the hard rails had lost 5 per cent. more than the soft. The total result of 5,675 days' service and 98,938 trains, is that the soft rails have lost 7 per cent. more than the hard. Here we get a curious confirmation of the observations on the German rails, namely, that the loss of the soft rail is very much greater than that of the hard rail in its early life, but that it is actually less in its later life.

Still another interesting point is brought out. In the first reweighing it was discovered that per meter and per 10,000 trains, the hard German rails lost 133 grams, while by the second weighing it was discovered that they lost only 91 grams per meter and per 10,000 trains. In the soft German rails these losses were respectively 170 and 80. Again, taking the Belgian rails: At the first reweighing it was discovered that the hard rails had lost 121 grams per meter and per 10,000 trains, while on their second reweighing they had lost 98 grams. The soft rails lost 156 grams per meter and per 10,000 trains in the first period and 93 in the second period.

It will be observed that the loss of weight per unit of service is much greater in the early history of the rail than in the later. In fact, combining the experiments of the German and Belgian rails, we find that the hard rail wore out 35 per cent. faster in the early part of its life than it did in the later part of its life, while the soft rail wore out 89 per cent. faster. Probably some such difference in the wear of the two rails at different periods in their lives would be expected by every rail-maker and rail-user, for it has long been observed that the quality of the top of the rail improves under the cold rolling of the wheels. In fact, the suggestion has been repeatedly made that one reason why the old rails have worn so much better than recent rails is that in the early part of their history, while they were getting this preliminary cold rolling, they were subjected to light use. They were gradually toughened up to the heavier service that they had to endure in their later life. We think that it was Captain Hunt who first suggested to us this way of accounting for a part at least of the alleged superiority of the old rails.

It will be noticed that the rails which Mr. Post has observed are none of them what we should call hard. His hard German rail is only three points higher in carbon than the Northern Pacific soft rail and his hardest, namely, the 45 carbon Belgian rails, would be considered in American practice as only medium hard. For this reason it is doubtful if his observations have any great value for us, although they are a suggestive and interesting addition to the scanty knowledge of the subject.

Mr. B. H. Helm, Commissioner of the New Orleans Bureau of Freight and Transportation, has issued the fifth annual report of the Bureau. The report

shows a prosperous condition of the Bureau, indicating that the merchants and manufacturers of New Orleans appreciate the benefits derivable from such an institution. The catalogue of things accomplished by the Commissioner during the past 12 months fills 21 large pages. The larger part of the doings of the Bureau have to do, of course, with modifications of freight rates. Mr. Helm has not only secured reductions in rates from New Orleans to many places, but has also secured advances of rates from some competing centers to districts which New Orleans merchants desire to supply. This would seem to be carrying the war into the enemy's territory with a vengeance. This year, for the first time, the State of Louisiana has a Railroad Commission, and a number of matters concerning freight rates have been laid before that body. Mr. Helm devotes a chapter to an argument in favor of a federal government quarantine for the regulation of traffic in the Southern States when yellow fever prevails or is threatened. Conditions this year have, however, been less oppressive than heretofore, the "Atlanta agreement," which was adopted by Alabama, Mississippi and Louisiana, having served to modify many of the former annoying features of quarantine regulations. The Bureau has handled during the year 194 claims; of these 116 were paid, 32 withdrawn, six were unsuccessful and 40 are still pending. The report of a freight bureau like this must make very suggestive reading for the theorists who are trying to secure the establishment of one uniform freight classification throughout the United States. Those theorists are undoubtedly working in the interest of what they believe to be the general welfare; but each freight commissioner, acting for the merchants of a city of a quarter or a half million people, undoubtedly believes that he, also, is working for the best interests of the public. He and his constituents look upon themselves as being "the public" as truly as any other collection of citizens; and yet the freight bureaus, whether in New Orleans or elsewhere, are constantly striving to secure diversity of classification. Quite likely they, like the Committee of Railroad Commissioners who annually meet and pass resolutions, are in favor of a uniform classification, theoretically; but practically they are against it. They find that, in actual life, a vital element in meeting competition in its thousand different forms is to constantly fight for the lowest freight rates they can get, here, there and everywhere.

NEW PUBLICATIONS.

Between the Ocean and the Lakes; the Story of Erie. By Edward Harold Mott. New York: John S. Collins, 253 Broadway. 9 in. x 12 in. pp. 511.

This is a sumptuous volume and it deals with a subject of absorbing interest to railroad men. It is a history of the Erie Railroad from the earliest propositions for a railroad from New York City to Lake Erie down to the present year. The author appears to have the true qualifications of a writer of history. He gives an entertaining, unpadding running narrative, always clear and in good temper, and apparently in a perfectly impartial spirit; and presents original documents—in some chapters on almost every page—to substantiate what he says. The work is so well balanced and the matter is so carefully arranged that the book must prove acceptable to a large class outside of railroaders. If one were to find fault with the book he might say that some of these letters and other documents ought to be more clearly summarized in the main narrative, so that the reader could skip the full originals if so disposed. The book has many excellent full-page steel plate portraits, and many half-tones which are not so good. The portraits of some of the recent officers of the road are printed from very poor plates.

The author considers the Erie a pioneer railroad in a very comprehensive sense, and adheres to his ideal, introducing collateral history of other enterprises of the earlier years. He must have spent a prodigious amount of time and labor on the work, and there are no signs of hurry or slighting anywhere.

The history of a railroad appeals more particularly to two classes: to publicists and financiers who start such enterprises, and to the officers and men who do the actual work of building and operating railroads. The latter class, as a general thing, are only mildly interested in a road which they are not familiar with, and for financiers the same considerations apply, to a considerable extent, and, in addition, the essential features of financial history can generally be told in brief compass. But the Erie is exceptional in both respects. Its financial history includes the wrecking of the property by Fisk and Gould in 1868-72, which is a chapter of universal interest. Mr. Mott has treated this matter with fullness, clearness and impartiality. To superintendents, station agents, trainmen, civil engineers, etc., the Erie is exceptionally interesting from its prominence as a power and on account of the strong character of the men who managed it in its earlier days. The way in which Charley Minot, Hugh Riddle and other "old masters" of the art of railroading impressed themselves on the life of their day is here set forth in very attractive shape.

The scope of the work may be partially indicated

by a rehearsal of some of the headings in the list of contents. The first three are "In Embryo," 1779 to 1831; "Taking Form," 1831 to 1832; "Organizing Erie," 1832 to 1833. Eighteen chapters are given to the 18 administrations of the principal different presidents, chronologically arranged. These finish the main part of the work, but take up only about three-fifths of its pages. The remaining portion, somewhat in the nature of an appendix, gives details of the early struggles in the construction of the railroad, the local history to 1851, when the principal lines were finished, and what may be called the operating history, the latter taking about 75 pages. These last two include a great mass of personal and local matters gathered from many sources. There are numerous biographical sketches and considerable space is given to the principal statistics of the operation of the railroad from 1841 down.

The Commercial Management of Engineering Works. By Francis G. Burton. Octavo, 310 pages. Manchester: The Scientific Publishing Co. 12 shillings, 6 pence.

The title of this publication is broad enough to cover all engineering shops, but its actual scope is confined to the conduct of a specific line of bridge engineering and no mention is made of the foundry department, which is an integral part of general engineering work, in which the management and the determination of costs, if not especially difficult, are at least difficult enough.

The book contains much that is valuable, but there is no continuity of system set forth which follows a complete set of forms through the works, noting the various acts attendant upon their use. Further, there should be a glossary of terms in order that the student may at all times know exactly what meaning is intended, and it is often necessary to consider more than one division of cost, for since the selling price cannot always be fixed at a minimum which insures a profit, the costs should be grouped in classes and a comprehensive nomenclature would be as follows:

Initial Cost—Distributed labor and material. Prime Cost—Initial cost plus predetermined percentage for undistributed non-productive labor and material. Actual Cost—Prime cost plus predetermined percentage covering all other expenses incurred in conducting the business, such as administration, sales, insurance, depreciation, etc., usually grouped in the general expense account.

Since the difference between the prime cost and actual cost represents administrative expenses, which do not greatly vary with the volume of business, it is often advisable to distribute this expense over a greater volume of business than was originally considered, consequently we should always have at hand the prime cost. The stores ledgers should be used as a record of quantities and cannot be used as a financial invoice record; for in the disbursement of stores the current price should be charged or the quantities shown in cost-keeper's ledger with date of manufacture and the purchasing agent will furnish necessary prices. It is manifestly incorrect to use the "oldest purchase of which any portion remains in stock."

The author is unable to dispose of "loose tools." Since hand tools, oils, waste and supplies cannot be charged to any specific order or operation and are gradually disappearing, there should be a percentage for unproductive material based upon the total purchases as compared to the total merchandise purchased. Very little information is given as to how to compile results of the several operations of various machines. While it is not expected that any system will be perfect, it must be complete, and when such a system is given together with a complete description of the manipulation of each form, we shall have begun to translate theory into practice.

The Use of the Slide Rule. By F. A. Halsey, Associate Editor, American Machinist, etc. Van Nostrand's Science Series. New York: D. Van Nostrand Co., 1899. Price, 50 cents.

Mr. Halsey has produced an excellent little manual of the slide rule. In fact, it strikes us as being within the limits that the author has set for himself, at once the simplest and the most thorough primer of the subject that we have ever seen. The various operations which the slide rule will perform are discussed clearly and adequately, and the student is taken along so gradually that he cannot help becoming reasonably proficient with this very valuable tool if he follows the author's directions. By the time he has mastered the pages of this little volume he will know whether or not he needs anything more for his own special work, and will know what he needs. A few short chapters describe extended scale instruments, special slide rules and some special forms of computers.

Transactions of the American Institute of Mining Engineers. Volume XXVIII., February, 1898, to October, 1898, inclusive. New York: Published by the Institute; R. W. Raymond, Secretary, P. O. Box 223.

This volume of the Transactions contains 44+950 pages, being the complete proceedings for the period covered, together with the fine index to which we are accustomed in the publications of the Institute.

TRADE CATALOGUES.

Locomotive Sanders.—We have received from the American Locomotive Sander Co., Philadelphia, Pa., a pamphlet describing the various sanding apparatus made by that company. The American Company owns and manufactures the following devices, namely, the Leach, Houston, Dean, She and Curtis. These are shown in the pamphlet before us. The Leach sander is recommended by the company in preference to any other sanding device, and the various modifications of this are illustrated in detail. The She sander, which is an improvement on the Houston, is a siphon and ejector. The sand is carried through the pipes with great velocity and only a small amount of air is used. The Dean sander, which is put inside the sandbox, will deliver more sand than either the Houston or the She, and is better for heavy engines in severe service. This is economically applied to old sandboxes. The Curtis duplex engineer's valve is for use with all sanders where sand is to be applied simultaneously with the air brakes.

The Chisholm & Moore Mfg. Co., Cleveland, O., issues a small catalogue descriptive of chain hoists, cranes and other machinery which are worked by air and hand power. The Moore pneumatic chain hoist is designed so that it cannot settle by leakage of air and is not dependent on air supply for its support, and the speed is graduated at the will of the operator. The Moore pneumatic crane is driven by the Moore compressed air motor, which works at high speed and is reduced through differential gearing to the speed desired for the sprocket wheel or winding drum, which carries the hand chain or wire rope. The catalogue gives a description of some ingenious devices where air is used as the motive power and also describes and illustrates some hand-worked machinery.

Contractors' and Coal Handling Machinery and Industrial Railroads.—The G. L. Stuebner Iron Works, Third St., Long Island City, New York, have issued a catalogue, designated as Catalogue and Price List No. 555. It measures 6½ in. x 9 in., has 155 pages and contains illustrations of the large variety of machinery made by the works, together with descriptions and prices. Mr. Stuebner has for many years made a specialty of machinery for contractors. Among the articles covered by the catalogue are self-dumping and self-righting hoisting buckets for handling clay, sand, coal, ore, etc.; narrow gage cars for elevated coal trestles, industrial railroads and mining purposes; hoisting blocks; wheel-barrows; shop, warehouse, and dock trucks and small cast iron and wooden turntables.

The Brown & Sharpe Mfg. Co., of Providence, R. I., has issued Catalogue No. 101, containing illustrations, descriptions and prices of machinists' tools, rules, squares, micrometer calipers, gages and accurate test tools. The pamphlet measures 6 in. x 9 in. and contains 148 pages and a good index. A number of the cuts have never before appeared in the catalogue of the company and are especially fine. We are not told whether or not the octavo form of this catalogue is to be a permanent change from the little fat blue volume with which the customers of the house are familiar, but we venture to suggest that it is an improvement. People now file valuable catalogues, and the old form was a bad one for filing.

The Evans & Howard Fire Brick Company, St. Louis, Mo., has issued an attractive pamphlet for 1900, containing the information which a purchaser would want regarding fire clay, fire brick, cupola blocks, tile for locomotive fire box arches, chimney flue pipe, sewer and culvert pipe and fittings and paving brick. There are 23 pages and numerous illustrations.

The Boston Belting Co., Boston, Mass., has just issued a little pamphlet entitled "Suggestions," which contains a list and description of the many different kinds of rubber goods made by the company, interspersed with pictures showing the methods of obtaining and shipping crude rubber.

Messrs. W. J. Schaeffer & Co., of New York, send us two or three small catalogues showing the Eclipse pneumatic tools, air compressors, etc., the Lee injector, certain packings, and describing the line of lubricating oils and greases which they handle.

Pneumatic Tools.—The Standard Railway Equipment Company send us a catalogue showing the "Monarch" pneumatic tools. These show drills for wood and iron and hammers for calking, chipping and riveting.

The Howard Iron Works, Buffalo, N. Y., general iron founders and machinists, have just issued a new catalogue and price list of bolt cutters, pulleys, hangers, shafting, vises, and grindstone frames. The pamphlet measures 6 in. x 9 in., has 80 pages and is well printed. Many of the appliances are illustrated

and described in detail. Seven styles of Schlenker bolt cutters, of which the works make a specialty, are described and illustrated.

TECHNICAL.

Manufacturing and Business.

The United States Consul-General at Cape Town wrote last September as follows: "Among the orders placed for goods in the mechanical line last month were three boilers, viz., one 212 h. p. and two 108 h. p. placed with the Sterling Water Tube Co. of Chicago. Several electric cranes for Durban have been ordered. In the line of electrical machinery, several large orders have gone to England. One order for engines has been given to McIntosh, Seymour & Co., Auburn, N. Y. Chicago manufacturers are delivering a match plant in the South African Republic. Two more refrigerating plants from England are about to arrive. While the United States is in the lead in shipments of windmills to South Africa, several are arriving from England, largely copied from the American."

The Maryland Dredging & Contracting Co. has been incorporated in Delaware, with a capital of \$100,000, to conduct a general contracting business, especially river and harbor improvements. The office will be in Baltimore, Md.

The Kentucky Western, now building, will require some relaying rails. (See Railroad Construction column.)

A. J. Banks, Portsmouth, Va., would like to correspond with makers of stump pullers.

A. O. Norton, Boston, Mass., who makes ball-bearing lifting jacks, has added some new special machinery to his plant to keep up with the increasing demand for his product. He reports several large export orders received this month.

The Pratt Chuck Co. of Frankfort, N. Y., informs us that it has been found necessary to increase its force and to rebuild and make additions to its plant. Among foreign orders recently received was a large one from a ship building firm on the Clyde. The company reports numerous inquiries from all parts of Europe, and that it is now in correspondence with a large railroad system in Great Britain from which it has received a trial order.

The Little River Valley will want some rails immediately. (See Railroad Construction column.)

Iron and Steel.

The Bethlehem Steel Co. has declared a dividend of 50 cents per share, payable Dec. 1.

At the first quarterly meeting of the Niles-Bement-Pond Co. directors last week in New York, a quarterly dividend of 1½ per cent. was declared. The earnings of the company for four months, ended Oct. 31, were \$341,214.

Bids are wanted Dec. 12 for furnishing at the Mare Island Navy Yard, California, a quantity of sheet iron, bar iron, steel plates, steel shapes, electric motors, etc. A. S. Kenny, Paymaster Gen., U. S. N., Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.

The Globe Iron Works has been incorporated, with capital stock of \$50,000, by James Lee, Jr., W. T. Ahrens, W. R. Rodgers and others, of Memphis, Tenn.

The Musconetcong Iron Co. is about to start up its furnace at Stanhope, N. J., after being idle since 1892. A. Pardee & Co., of Philadelphia, are the owners.

A report during the week stated that the Federal Steel Co. has closed a contract for a large amount of steel railroad material for Glasgow, Scotland, the total value of which aggregates \$500,000. The order includes girder rails, frogs, switches, etc.

Laughlin & Co., Pittsburgh, Pa., have in contemplation, according to report, an additional 600-ton blast furnace.

The Safety Insulated Wire & Cable Co. of New York City will build a plant in the vicinity of Bayonne, N. J., the present plant being too small.

The remaining property of the Wellman Iron & Steel Co. at Thurlow, Delaware County, Pa., was sold last week to Benj. C. Fox for \$30,375. This plant has been idle since 1893.

The Hoosier Bridge Co., Indianapolis, Ind., was incorporated Nov. 13, with a capital of \$5,000. The directors are: Clarence A. Kenyon, Harry A. Mansfield and Frank H. Kenyon. This company, a week or so ago, got the contract for a concrete-steel bridge at Illinois St., Indianapolis, at \$50,900.

Application will be made Nov. 30 by the Steel Car Forge Co. for incorporation as a reorganization of the Baker Forge Co. Under the reorganization the capitalization will be \$200,000. Harry O. Evans, J. W. Chalfant, Jr., James S. Crawford and A. E. Boyd are the applicants for incorporation.

The Gruson Iron Works, which was incorporated last May in New York, with a capital of \$500,000, has a location for its plant at Eddystone, Pa., on the Delaware River.

Reports state that the material for the steel plant to be built at Sydney, Cape Breton, will soon be shipped from Philadelphia. The Dominion Coal &

Iron Co. is owned by the syndicate which is to build this plant.

The Central Iron & Steel Company has started work on two additional furnaces at its works in South Harrisburg, Pa. The mill contains three large furnaces and the new ones will be about the same size. A large frame stock shed is also being built.

The Hussey-Truxell Steel Co. has been organized and will build a plant at New Kensington, Pa. Among the persons reported interested are O. P. Curran and C. G. Hussey. It is proposed to take over the plant of Howe, Brown & Co. at New Kensington.

Owing to the scarcity of coal, the puddling and rolling departments of the American Iron & Steel Manufacturing Co. in Lebanon, Pa., had to shut down last week.

The Sloss-Sheffield Steel & Iron Co., which was recently organized, has elected the following permanent directors: Archer Brown, of Rogers, Brown & Co.; Joseph Bryan, President of the Richmond Locomotive Works, Richmond, Va.; W. H. Goadby, of W. H. Goadby & Co., New York; Sol Haas, of Birmingham, Ala. The authorized capital stock is \$20,000,000, of which \$10,000,000 is 7 per cent. non-cumulative preferred, and the remainder common stock. Of this \$6,700,000 preferred and \$7,500,000 common stock is to be issued at present, leaving the rest to build a new steel plant when deemed advisable. It is stated that the capacity of the new company, when the improvements are completed, will be between 25,000 and 30,000 tons of pig iron per month. The properties owned by the new company are the Sloss Steel & Iron Co. of Alabama, which has been in successful existence for 13 years; the Philadelphia Furnace, the Hattie Ensley Furnace and the Lady Ensley Furnace Co., together with large bodies of brown ore land in the Russellville district of Alabama. The new company has also acquired the property of the American Coal & Coke Co. and other large coal properties in Walker and Jefferson counties, Alabama.

The Union Steel Co. of Pittsburgh has been chartered with a capital of \$1,000,000. It proposes to build a blast furnace of about 600 tons daily capacity, a basic open hearth plant of about 1,000 tons daily capacity, and also a rod and wire mill. The E. P. Allis Co., of Milwaukee, and the South Ward Foundry & Machine Co., of Philadelphia, have the contracts for engines. The Shiffer Bridge Co. has the contract for the rod mill.

The Elliott-Blair Steel Co., of New Castle, Pa., are making some additions to their buildings and increasing the size and capacity of the annealing department.

A foundry 50 x 140 ft. is being built by T. C. Wright at West Superior, Wis.

Interlocking.

The Illinois Central has let the contract for interlocked switches and signals at all points between Chicago and Sioux City, where the line intersects other roads, as follows: With the Northwestern at Colvin Park, Ill., \$4,700; with the C. B. & Q. at Galena, Ill., \$5,200; with the B. C. R. & N. at Independence, Ia., \$4,800; with the same road at Cedar Falls, Ia., \$6,200; and at Ackley with the Iowa Central, \$5,000. The power at these interlockings is to be electricity, which will also furnish light for the signal lamps.

A New Journal Bearing.

The Spiral Journal Bearing Company, St. Louis, Mo., has brought out a new journal bearing for cars which consists of a cast iron or hard brass shell in which a skeleton bronze lining is held in place by anti-friction metal, made 3/32 in. thick on the face. The skeleton lining is spiral in form, so that when partly worn there is a continuous bearing on both metals. The outer shell is intended to be relined and used several times. A similar construction has been adapted to locomotive bearings and the bearings of motors and shop machinery. The car bearings now in service are said to have given satisfactory results and the claim is made that these bearings are cheaper than those now generally used.

The Vanderbilt Boiler.

We have already mentioned the fact that five of the new engines to be built for the New York Central are to have Mr. Vanderbilt's boiler with the corrugated firebox. These new boilers will be like the one now running, with a little modification; that is, it has been discovered that there is not space enough above the top of the firebox in the existing boiler, and this space will be enlarged in the new boilers by raising the shell. There will be a few other changes in dimensions consequent upon this.

An Emergency Air Compressor for Pneumatic Signals.

With a view to demonstrating what can be done to prevent a stoppage of business in case of accident to air compressors, the officers of the Boston Terminal Company made the experiment, last Sunday, of working the electro-pneumatic switches and signals in the large yard at the new South Station with compressed air furnished by locomotives. The compressors were shut off and the air brake pipes of the locomotives were connected with the signal tower through one of the numerous outlets in the mains

which are provided for charging passenger cars with air in the yard. Three locomotives were found amply sufficient to maintain the air pressure for the maximum demand made by the present volume of business. Two of these locomotives had 9½-in. pumps, and one had an eight-inch. They were selected at random from engines coming into the yard. Mr. Francis, the engineer of the Terminal Company, informs us that the experiment was in every way successful, and very quickly performed, no special connections being found necessary.

Tests of Wrought and Malleable Iron Signal Connections.

In the preparation of the plans for the electro-pneumatic interlocking for the switches and signals at the new South Station in Boston, the question was raised as to the relative strength of malleable iron and wrought iron jaws and pipe connections for switches; and to throw light on the matter three specimens of each kind were tested at the Massachusetts Institute of Technology. The specimens were one-inch pipe with the usual jaws, and riveted pipe connections. The three wrought iron jaws broke under a strain of 24,180 lbs., 24,480, and 21,290 respectively, an average strength of 23,317 lbs. All of these broke through the eye. The three malleable iron jaws broke at 29,050 lbs., 30,340, and 37,850, an average of 32,443 lbs. One of these broke in the eye, one broke in one side of the jaw near the outer end, and one broke in both the jaw and the eye. One riveted pipe connection broke at 26,010 lbs., one at 25,910, and one at 25,760. It will be seen that the malleable iron jaws were 39 per cent. stronger than the wrought iron. Both materials were bought of reputable makers in the usual course of business, and neither was specially selected.

Enriched Pintsch Gas in Europe.

One of the high officials of the Prussian State Railroads reports that by the addition of 25 per cent. of acetylene to the enriched gas formerly used in the Pintsch apparatus, the amount of light is tripled, and the cost for the same amount of light reduced more than one-half. The railroads under the Berlin directory have now a number of establishments for mixing the gases, and in the course of next year nearly all the gas works of all the Prussian State Railroads will be so transformed. The adoption of the same system on other German railroads indicates a consumption of some 17,000,000 lbs. of carbide yearly, simply for lighting cars in Germany, at a cost of some \$500,000.

This plan is promoted by the Pintsch Company of Berlin. The Pintsch gas made in Europe from oils available there is of poor quality, and the addition of the acetylene brings it up to a candle power still slightly under that of American Pintsch gas. The Safety Car Heating & Lighting Co. owns the American patents for this enriching process.

The Westinghouse Steel Foundry.

A steel foundry and steel forging plant will be built early next spring by the Westinghouse Machine Company at East Pittsburgh at a cost of about \$1,250,000. The plant will have a capacity of about 80 tons of steel castings and forgings a day, and will make the Westinghouse Company the only concern in the United States who manufacture everything for their engines, except the pig iron. The new plant will be erected to the west of the present shops of the company at East Pittsburgh. The plans will provide for one of the most elaborate and modern plants ever built in this country. The steel foundry will be about 400 ft. long and 200 ft. wide, with two 40-ton open hearth furnaces. The plant will have a daily capacity of about 75 or 80 tons of castings and ingots. The forging shop will be of the same length as the foundry and will be so joined to it that the operations in the two buildings will be continuous. The forging shop will be about 150 ft. wide; it is expected to make engine forgings of all sizes up to 20 tons each. The Westinghouse Machine Company is now capitalized at \$3,000,000 and have an outstanding indebtedness of \$350,000. The officials will request the stockholders to increase this latter indebtedness to \$1,600,000 to provide for the erection of the new buildings.

The Pneumatic Tool Litigation.

We gave last week a note of the status of litigation over pneumatic tool patents. We have this further statement from the Standard Pneumatic Tool Company: "On October 16, 1899, we notified the Chicago Pneumatic Tool Company of Chicago, Ill., selling agents for the Boyer pneumatic tools of St. Louis, that they were directly infringing on our letters patent and demanded that they stop selling them and account to us for all that they had sold up to date. They replied, stating that they would like to purchase our patent, which practically admits infringement on their part. We refused to sell, and have brought suit against the Chicago Pneumatic Tool Company and the Boyer Machine Company, in the United States Circuit Court of St. Louis, for infringement. We manufacture the Little Giant hammers under exclusive license obtained from the Chateau Manufacturing Company. The suit which the Chicago Pneumatic Tool Company have brought against us applies only to the pneumatic hammer. The validity of the patents under which

we manufacture all our other tools and appliances has never been under dispute. As above stated, we notified the Chicago Pneumatic Tool Co. that they were infringing on our pneumatic hammer patents. They entered counter suit against us on pneumatic hammers."

A Car Wheel Company.

The Pennsylvania Casting & Machine Co., organized in August by interests of the Pennsylvania Car Wheel Company, with a capital of \$60,000, is to increase this to \$200,000. The original plan was to make castings of various descriptions, but this has been dropped to make a specialty of car wheels. The capacity of the plant, when in full operation, will be 300 wheels a day.

THE SCRAP HEAP.

Notes.

The railroads centering in Atlanta, Ga., are to appoint a Superintendent of Terminals to manage the Union passenger station and the work of all the roads at that station.

The Lake Shore & Michigan Southern has restored the sleeping car service between Buffalo and Detroit, which was taken off at the opening of summer when the passenger steamboats began running.

The Delaware, Lackawanna & Western has made changes in the rates of wages of section foremen, crossing watchmen and laborers. It appears that in some cases there are moderate increases and in others decreases.

The Delaware, Lackawanna & Western has abolished the use of the pay car, except in the vicinity of the coal mines, where the car will be used about seven days each month. At other places the men will be paid by checks.

Train No. 2 of the Lake Shore & Michigan Southern was robbed by masked men near Conneaut, Pa., about 1 o'clock on the morning of Nov. 16. The express messengers succeeded in scaring off the robbers before they had secured much and it is reported that they took nothing of value.

The Burlington road has changed the plan for registering trainmen's watches. Hereafter the principal record of each watch will be on a card kept by its owner, which he will present to the watch examiner at each examination and which will be filled out by the examiner. Each card will last three months.

The Empire State Express of the New York Central now has capacity for seating 257 passengers. The two-day cars now in use are each 70 ft. long, with 86 seats. The smoking car contains 50 seats and the parlor car 35. The day cars have wash basins, soap and towels at either end, and an electric push button at each seat, for summoning the porter.

It is reported that the Michigan Central will withdraw from the Clearing House for Freight Accounts, which was established by the Vanderbilt Lines at Buffalo a few months ago; while at the same time the business of the Clearing House is to be increased by the accession of the Cleveland, Cincinnati, Chicago & St. Louis, which will become a member on December 1.

In the case of the Hoboken Railroad, Warehouse & Steamship Connecting Co. the Supreme Court of New Jersey has decided that the line of the company, used for transferring freight between the Erie road and certain piers, is to be classed for purposes of taxation as belonging to "a railroad corporation," notwithstanding the fact that its motive power is electricity, worked by the overhead trolley, the same as a street passenger railroad.

At the request of numerous patrons, the Metropolitan Street Railway, New York City, has decided that on its Madison avenue line open cars, for passengers who smoke, shall be run all winter. The cars to be used, of which the company has about 40 on the Madison avenue line, have something more than half their space taken up with transverse seats as for summer use, and the remainder is enclosed like an ordinary winter car. It is proposed to run these cars at intervals of seven minutes.

The United States Board of Inspectors of Steam Vessels at New York has made an investigation of the collision between the Pennsylvania Railroad ferryboat "Chicago" and the steamship "City of Augusta," which occurred in the North River near the Cortlandt street terminus of the ferry on Oct. 31, and makes a report holding that the collision was entirely due to the negligence of the pilot in charge of the "Chicago," in not keeping a proper lookout. The pilot's license is suspended for six months, and the officer who was in charge of the "City of Augusta" is exonerated.

The newspapers have been publishing rumors—which, however, were promptly denied—to the effect that the New York, New Haven & Hartford would sell out its sleeping cars to the Pullman Company. The stories were started by the fact that the officers of the road and of the sleeping car company held a number of conferences, and it is now given out that the real purpose was the opposite of that reported; the New Haven road will try to get rid

of what Pullman cars it has. There is a line between Boston and Fall River, connecting with the steamboats, and this appears to be the one particularly referred to, though there is also a Pullman line twice daily each way between Boston and Washington which runs over the New Haven road east of Harlem River station and is carried by the boats of the New Haven Company between Harlem River and Jersey City. The contracts have yet many years to run.

Notes on Canals.

The Albemarle & Chesapeake Canal Co., at its annual meeting in Norfolk, Va., Nov. 17, elected the following officers: Warren G. Elliott, President; Robert M. Cannon, Vice-President and General Manager; D. S. Burwell, Secretary and Treasurer.

Only one bid was received at the U. S. Engineer Office in Galveston, Tex., last week, for dredging a ship canal from Texas City, on the main land, to deep water in Bolivar channel, a distance of about four miles. Drake & Stratton Co. of New York bid \$250,000, the exact amount appropriated by Congress.

The Saulanges Canal, the last link of the 14-foot navigation of the St. Lawrence, which has been completed at a cost of \$5,250,000, was opened for traffic recently. There is now uninterrupted inland navigation, for vessels drawing 14 feet of water, from Quebec to the head of Lake Superior.

A project for a canal from Grand Forks, N. D., to Duluth, Minn., connecting the wheat region of the Red River Valley with Lake Superior by water, is proposed. M. McGowan, of Trenton, N. J., is said to be interested.

Negotiations are said to be pending for the sale of the Lake Drummond Canal & Water Co., which owns and operates the Dismal Swamp Canal. The Lake Drummond Canal & Water Co. is capitalized at \$2,200,000, of which \$1,200,000 is first mortgage, 5 per cent., 30-year gold bonds. The Dismal Swamp Canal begins in Virginia, on the south branch of the Elizabeth River, about six miles from Norfolk, and extends in a southerly direction about 20 miles to the Pasquotank River in North Carolina.

A convention of the Western Water Ways Association was held at Memphis, Tenn., Nov. 14-15, about 600 delegates from 16 States being present. The principal address was made by Congressman Thomas C. Catchings of Vicksburg, Miss., who advised the delegates to ask Congress for an appropriation of \$20,000,000 for river and harbor improvements. Mr. Frank Werter, the delegate from the Peoria Deep Water Ways Association, gave an account of the work done on the Drainage Canal, and Mr. L. E. Cooley made an address explaining the benefits to come from the completion of the Drainage Canal, and setting forth the advantages to accrue from opening connection by water from Chicago to the Gulf of Mexico, after which the following resolution was unanimously adopted:

Resolved, That we recognize the supreme utility of the deep water way between the great lakes and the Gulf of Mexico, and recommend to the serious consideration of Congress the entire subject matter to the intent that such a project shall be matured and such work undertaken as will provide a water way of the greatest utility between Lake Michigan at Chicago and the Mississippi River.

Other resolutions were adopted substantially as follows: Approving all river and harbor work done or begun, and urging more liberal appropriations.

Declaring the duty of the federal government to assume exclusive control of work in the levee districts of the lower Mississippi Valley for the protection of that section from floods.

Recommending that the general government construct an isthmian canal connecting the Gulf of Mexico with the Pacific Ocean.

Recommending the establishment of an additional cabinet office, to be known as the Department of Commerce and Industries.

Cairo, Ill., was selected as the next meeting-place and the Convention adjourned sine die. A banquet was given the delegates in the evening, and on Thursday morning many delegates left by a special train for New Orleans, where the work on the mouth of the Mississippi River was inspected.

The Pennsylvania Canal Co.'s property in Mifflin County has been sold to the Pennsylvania Railroad for \$100,000. The property, authorized by the last legislature to be abandoned, is the strip occupied by the canal between Duncan's Island, near Benvenue post-office, close to the junction of the Juniata and Susquehanna Rivers, along the Juniata River and the Pennsylvania Railroad, to the first lock east of Newton Hamilton, in Mifflin County.

Newspaper reports say that Representative Hepburn of Iowa, Chairman of the House Committee on Interstate and Foreign Commerce, does not believe that any legislation for an isthmian canal can be obtained at the coming session of Congress, although he intends to re-introduce his bill to build the Nicaragua Canal.

Proposals in triplicate for constructing three miles or less of Feeder of Illinois & Mississippi Canal, from mile 9 to 11, inclusive, near Tampico, Ill., will be received at the U. S. Engineer office, 1637 Indiana Ave., Chicago, Ill., until 12 noon, central time, Dec. 2, and then publicly opened. Major W. L. Marshall, Corps of Engineers, U. S. A.

Sealed proposals for furnishing and building diverting channel for Sausal Creek, contiguous to tidal canal, Oakland Harbor, Cal., will be received at the U. S. Engineer Office, in San Francisco, until 12 noon, Dec. 28. Major W. H. Heuer, Corps of Engineers, U. S. A.

Grade Crossings in Cleveland, O.

A meeting of the Special Grade Crossing Committee of the City Council of Cleveland, O., was held Nov. 8. The various railroads entering Cleveland have been requested to send representatives to a meeting to be held in that city Nov. 18, to discuss plans for the abolition of the grade crossings. There are 131 grade crossings for abolishing which the City Engineer has prepared plans.

Grade Crossings in Newark, N. J.

The Newark, N. J., Board of Works is again talking about grade crossings. The Pennsylvania R.R. stands ready to raise its tracks, but cannot do so until the Central of New Jersey railroad bridge, which crosses the Pennsylvania, is raised.

In connection with a new station at Broad St., proposed by the Lackawanna Railroad for Newark, we are informed that there are so many other things in connection with a scheme for improvements there that it cannot be worked out except by long study and at much expense of time and money.

No Smoking for Dames Seules.

On most Continental railroads certain compartments of passenger cars are reserved for ladies; some others are provided with a notice that smoking is not allowed. In Belgium lately a well-dressed woman entered a compartment reserved for ladies, and soon after the train started began smoking. The other occupants protested, but the smoker said that there was no sign forbidding smoking, and she puffed away to the end of the trip in Brussels. Here some of her fellow-passengers complained to the station-master. He confessed that the question was too much for him, and reported to headquarters. The result is that now all compartments reserved for ladies show under the sign "Reserved for Ladies," the other, "No Smoking," and the lady who wishes to enjoy a quiet smoke on the train has to take her chances with the men.

The Coupler and Brake Law.

Numerous railroads having petitioned the Interstate Commerce Commission for a further extension of time in which to equip their cars with automatic couplers and brakes, the commission will hold a hearing on Dec. 6. All parties interested will be heard.

To Make Automobiles and Gasoline Engines.

The Continental Automobile Co., incorporated in New Jersey with a capital of \$8,000,000, owns by purchase the Winton Motor Carriage Co., Cleveland, O.; the Manhattan Oil Motor Co., Jersey City, N. J., and the National Motor Carriage Co., New York, and patents covering the use of gasoline, kerosene and petroleum as applied to motors or engines for automobiles, marine and stationary power uses. Plants located at Jersey City, N. J., and Cleveland, O., have a capacity of 500 automobiles a year. The engineers are Alexander Winton, Cleveland, and Viggo V. Torsbensen, Jersey City.

Graded Fare System of the Chicago General Railway.

The graded fare system, which was put in effect September 7 on the Chicago General Railway (see Sept. 22, p. 664), has so far resulted in an increase in the number of passengers carried and also an increase in the passenger receipts. A comparison of September and October of this year with the same months last year shows an increase of 16 per cent. in gross receipts and an increase of 234 per cent. in the number of passengers carried. Also, the number of passengers carried last October was 17 per cent. greater than for the previous month, whereas a decrease usually occurs at that time of the year. Mr. C. L. Bonney, the Vice-President of the road, says that travel has been so stimulated that a greater number of five-cent fares has been collected on the branch lines than before the cheap tickets were placed on sale, and in his opinion a graded fare system could be applied to the entire city without loss to the railroads, while the public would be greatly benefited. The rates which the Chicago General has adopted are as follows: Single fares on all lines with transfer privileges are five cents, while six tickets are sold for 25 cents good on all lines with transfers, making the longest ride 6½ miles. On the two branch lines, 12 tickets are sold for 25 cents, without transfers. The main line is on Twenty-second Street, extending from Wabash Avenue west to West Fortieth Avenue, 5¼ miles. One branch leaves Twenty-second Street at Throop Street and runs south on Throop and Morgan Streets, 2¼ miles, to Thirty-ninth Street, and the Stock Yards District. The other branch leaves the main line at Rockwell Street and runs south for three miles through Rockwell and Twenty-fifth Streets and Lawndale Avenue to Thirty-sixth Street and the Drainage Canal.

Railroad Disaster in Japan.

Japanese newspapers received at San Francisco report that the disaster to a passenger train in a windstorm near Utsunomiya, several weeks ago, was more fatal than appeared from the telegraphic despatches. The whole train was blown off a bridge, into a river in which there was a great flood, and 20 of the passengers were drowned. There were 80 altogether on the train and 40 of these were injured.

Steel Roadway in Spain.

The road between Valencia and Grao is two miles in length, and an average of 3,200 vehicles pass over it daily. Until 1892, it was constructed of flint stone. The annual cost of keeping it in repair was about \$5,470. The construction of a steel roadway was determined on, and the annual cost of keeping in repair the central belt of road thus relieved from heavy traffic—which proceeds over the steel rails—is now about \$380. A Belgian firm received the contract to furnish the steel work, having bid less than Spanish firms at Barcelona and Bilbao. The length of road so built is 3.2 kilometers. The cost per kilometer was \$6,890. The total cost of the road laid was \$3,506. The expense in detail was: Steel, \$6,890; transportation and laying steel, \$507; binding-stone construction, \$2,109—total, \$9,506. The rails, during the seven years they have been in position, have not required repairing. At each side of the rail are layers of binding stones, the paved road being higher than the face of the rails. A toll of (about) eight-tenths of a cent is charged each vehicle passing over this roadway.

New Chicago & Alton Cars.

The Chicago & Alton has put an entirely new equipment of cars on its fast day trains between Chicago and St. Louis. Each train consists of six cars, all of which have just been completed by Pullman's Palace Car Co. The postal car is 66 ft. long and the other cars are a combination passenger and baggage car, a coach, a parlor car, a café and buffet smoking car and a parlor and observation car, all of which are 72 ft. 6 in. long over the end sills. These cars all have Pullman standard framing, Empire decks, wide vestibules, Standard steel platforms and anti-telescoping devices and are supplied inside with every comfort and luxury. The three first cars are lighted with Pintsch gas, the others by electricity from storage batteries. All the windows in the train are large and of uniform width, and art glass is freely used. The painting and ornamentation of the train is elaborate, maroon being the outside color. The cab of the locomotive and the tender are decorated in maroon to match the cars. The wheels of the engine are in olive green and striped with gold. On Nov. 16 a party of railroad and newspaper men were taken on a run from Chicago to Joliet and back on one of these trains.

Illinois Deep Water Way Association.

The Executive Committee of this Association, which will have active charge of the work, held its first meeting in the rooms of the Sanitary District at Chicago, Nov. 8, instead of at Springfield, Ill., as had been planned. Col. Isaac Taylor, Chairman of the Executive Committee, called it to order and the organization of the committee was perfected. It was agreed that Congress should be asked to appoint a board of competent engineers to make surveys and investigate the general route of the proposed deep water way to the Gulf of Mexico, with a view to determining the cost and work necessary to permit ships to pass from the lakes through the Drainage Canal, the Illinois and Michigan Canal, the Hennepin Canal and the Mississippi River to the Gulf. A Committee on Legislation of 11 members was appointed, consisting of Messrs. L. E. Cooley, Frank Wenter, Judge O. N. Carter and Thomas Gahan, of Chicago; L. B. Ray and Henry Mayo, representing the Upper Valley; N. E. Worthington, of Peoria; J. D. Hess and L. Lowenstein, representing the Southern Valley District, and W. P. Kennett and J. A. Ockerson, of St. Louis.

Moving Troops by Trolley Cars.

On Oct. 30 the Forty-second Regiment, U. S. V., left Fort Niagara at the mouth of the Niagara River, 12 miles from Niagara Falls and seven miles from Lewiston. The fort is in the village of Youngstown and at this season of the year the only means of communication with other towns is by the Lewiston & Youngstown Frontier Electric Ry., a trolley road connecting the two villages. The business of the road has been greatly increased both in passenger and freight traffic, during the organization of the regiment, and when the day came for it to start West the road carried the regiment to Lewiston, one battalion at a time, in a train of 11 trolley cars and a special motor car.

The Largest Steamers.

The launching a short time ago of the Cunard liner Ivernia, the fourth largest steamer in the world, has brought about a revision of comparisons heretofore made between the largest vessels afloat. Of the twenty steamers of more than 11,000 tons register, nine are British, nine German and two American. Of the German boats, two are the product of Harland & Wolff's yard, so that of the twenty vessels,

Names.	Builders.	Owners.	Gross Tonnage.	Length between perpendiculars, Feet.
Oceanic	Harland & Wolff	White Star Line	17,274	685.7
Deutschland	Stettin Vulcan Co.	Hamburg-American Line	15,500	637.4
Kaiser Wilhelm der Grosse	Stettin Vulcan Co.	Nord. D. Lloyd	14,349	580
Ivernia	Swan & Hunter	Cunard Line	13,900	580
Not yet named	Clydebank Co.	Cunard Line	13,900	580
Patritia	Stettin Vulcan Co.	Hamburg-American Line	13,000	560
Lucania	Fairfield Co.	Cunard Line	12,952	601
Campania	Fairfield Co.	Cunard Line	12,950	601
Pennsylvania	Harland & Wolff	Hamburg-American Line	12,891	580
Graf Waldersee	Blohm & Voss	Hamburg-American Line	12,800	580
Pretoria	Blohm & Voss	Hamburg-American Line	12,800	580
Cymric	Harland & Wolff	White Star Line	12,647	585.5
Grosser Kurfürst	Schichau	Nord. D. Lloyd	12,500	581.5
Kaiser Friedrich	Schichau	Hamburg-American Line	12,480	581.5
Medic	Harland & Wolff	White Star Line	11,985	550.2
St. Louis	Wm. Cramp & Sons	American Line	11,629	535.5
St. Paul	Wm. Cramp & Sons	American Line	11,629	535.5
New England	Harland & Wolff	B. & N. A. St. Nav. Co.	11,394	550.3
Africa	Harland & Wolff	White Star Line	11,183	550.2
Belgia	Harland & Wolff	Hamburg-American Line	11,100	500.3

eleven were built in Great Britain or Ireland, two in the United States and seven in Germany. If, however, the vessels of from 10,000 to 11,000 tons are taken into consideration it becomes readily apparent how serious is the competition which Germany is offering to Great Britain. Of this class of steamer German owners have in commission or building a total of ten, while Great Britain has but one, and Holland one. The twenty steamers of more than 11,000 tons gross register each, range according to their size as shown in the accompanying table.—Marine Review.

The World's Production of Iron Ore and Coal.

The following table from the Bulletin of the American Iron and Steel Association gives the production of iron ore and coal in all countries in 1898, or for the latest year for which complete statistics are available. English tons of 2,240 lbs. are used in giving the production of the United States, Great Britain, Canada, Cuba, India, New South Wales and other Australasia, and "other countries," and metric tons of 2,204 lbs. are used for all other countries, metric tons being used as the equivalent of English tons in ascertaining the total production of all countries.

	Iron ore.		Coal and lignite.	
	Tons.	Cent.	Tons.	Cent.
United States	19,278,369	26.17	196,405,953	29.63
Great Britain	14,176,938	19.24	202,054,516	30.48
Germany and Luxemburg	15,839,246	21.57	130,928,490	19.75
France	4,582,236	6.22	32,439,786	4.89
Austria-Hungary	3,335,005	4.53	22,075,093	3.33
Russia	4,107,470	5.58	12,862,033	1.94
Sweden	2,302,914	3.13	236,277	.04
Spain	7,125,600	9.67	2,526,600	.38
Italy	2,000,709	.27	314,222	.05
Canada	51,929	.07	3,725,585	.56
Cuba	164,077	.22	.....	.....
South African Republic	.....	.....	1,907,808	.29
India	443,314	.66	4,588,880	.69
Greece	501,038	.68	17,300	.....
New South Wales	234	.....	4,736,000	.72
Other Australasia	.....	.....	1,488,616	.23
Japan	327,421	.44	6,000,000	.91
Algeria	441,467	.60	.....	.....
Other countries (about)	1,197,259	1.62	4,533,424	.69
Total	73,670,000	100.00	662,820,000	100.00

* For year 1897. † For year 1896.

Good Roads in Illinois.

During recent months good roads have been considerably discussed in Illinois and under the auspices of the State and Interstate Good Roads Association, which is working for improved highways in a large number of States, including Illinois, Iowa, Wisconsin and Minnesota. Conventions were held in about 15 of the larger towns in Illinois during August and September last. In connection with the State Fair at Springfield, Ill., recently, a State convention of the Association was held. The Association has now opened an Illinois headquarters in Chicago and com-

mittees will be appointed and a permanent organization effected.

Hawaiian Railroad Notes.

The contract to furnish the steel bridges for the Wailuka & Waiakae RR., of Hawaii, has been given to Messrs. Wilson & Whitehouse, of Honolulu.

Mr. C. H. Kluegel is the Chief Engineer of the new railroad which is about to begin operations on the Island of Hawaii.

An electric railroad company, of which Mr. C. C. Vallentyne is Manager, is preparing to build a line in Honolulu.

The Oahu Railway & Land Co., Honolulu, has let a contract to the Pacific Coast Dredging & Reclamation Co., to dredge 180,000 cu. yds. of sandy material. The company will build two pile wharves, 50 ft. x 400 ft.

Electricity on the Third Avenue Railroad, New York.

The work of changing the lower section of the Third Avenue line from cable to conduit electric was begun at 2 o'clock last Sunday morning and completed Monday forenoon. The new 41-ft. cars were then placed in operation to Chambers St. These cars are fitted with upholstered cross seats and are lighted by 20 electric lights. Air brakes are used besides the regular hand brake. Each car will seat 40 passengers.

Water-Works in Panama.

Consul-General Guder sends from Panama an invitation for bids to build the aqueduct to supply the city with water. Tenders will be received at the Secretaryship of Finance for the Department up to 2 p. m. on the 30th of December next for the construction of a water supply for the city of Panama. The main pipe will have diameter to insure with perfect certainty, and even after the pipes are old, a discharge of water under all circumstances of not less than 1,500,000 gallons approximately in 24 hours.

Calcium Carbide, and its Transport throughout Germany.

(From Abstracts of Papers, Inst. C. E., London.)

The handling of calcium carbide for the production of acetylene is a matter of much importance. By far the largest quantity of this material is imported into Germany from abroad. Illumination by means of acetylene has as yet scarcely entered into active competition with gas-lighting and electricity. It would seem that with a minimum number of 1,500 burners and calcium carbide costing not more than 1.7d. per lb., acetylene lighting can compete with illumination by means of coal gas.

Calcium carbide is one of the most concentrated vehicles for the storage of energy, since 2.2 lbs. of this substance will yield 1 h. p. for two hours, whereas an equal weight of coal will only furnish half this amount of power in the same time. Power can be stored in mountain districts in carbide, to be employed far off in the lowlands, and in this way it may be possible ere long to render many Alpine torrents available for industry. Hitherto, in consequence of imperfect acquaintance with the conditions under which danger may arise, this substance has been viewed with apprehension, but with proper precautions it is less dangerous to handle than many other combustibles. The need for package in soldered vessels has caused many difficulties, and attention is directed to a suitable form of package, namely, a metal drum with a specially closed aperture at one end, provided with a safety-valve capable of giving a signal when the contents reach a pressure of $\frac{1}{10}$ atmosphere above normal and continuing to do so until the over-pressure sinks to at least $\frac{1}{2}$ atmosphere above normal pressure.

Street Railroads in State of Vera Cruz. Vice-Consul Pages of Vera Cruz sends the following statement of the street railroads in the State of Vera Cruz to the State Department: Ferro-Carril Urbano de Jalapa a Las Puente; capital stock, \$150,000 in Mexican currency. Ferro-Carril Urbano de Cordoba; capital stock, \$24,500 in Mexican currency. Empresa del Ferro-Carril Urbano de Vera Cruz. This property has recently been acquired by an English syndicate. The capital is to be \$250,000. Empresa Urbano de Orizaba; individual enterprise owned and managed by Angel Jimenez, Orizaba, V. C. Ferro-Carril Urbano de Alvarado; private enterprise owned and operated by Vives Hermanos, Alvarado, V. C. Ferro-Carril Urbano de Tuxpan; private enterprise of small magnitude. The above roads are at present operated by mule power. There is in no case a bonded debt. The Vera Cruz road, when rebuilt, is expected to be a well-equipped, modern electric railroad, furnishing ample transit facilities for Vera Cruz. In their management the roads are conservative, and even the least profitable are supposed to be on a paying basis. These roads have hitherto obtained their equipment and supplies chiefly from the United States.

Lake Notes.

The steel schooner Manila of the Minnesota Steamship Co. delivered at South Chicago last week a cargo of 8,376 net tons of ore from Two Harbors on Lake Superior. This is said to be the largest cargo ever carried on the lakes. The Manila was built at South Chicago last summer. (June 23, p. 458; Aug. 11, p. 572.)

It is understood that the Chicago Shipbuilding Co. will build six large freight carriers during the winter for the Minnesota Steamship Co. and the Carnegie Steel Co. The largest boat will be 454 ft. long over all and each one will have a capacity of 7,000 tons. Reports from Milwaukee say that the Starke Dredging Co. of that city has received a contract from the U. S. Government for dredging 1,066,000 cu. ft. of material from the lower end of Portage Entry, Keweenaw Point, the work to take two years. Extensive dredging and pier work is under way at the other end of the water-way and when completed

the large lake vessels can save about 60 miles through rough water.

Nov. 30 the people of Collingwood, Ont., will vote on a proposition to give a bonus of \$50,000 to Duluth capitalists to establish a steel shipbuilding plant at Collingwood. The money is to be paid in annual installments of \$2,891.51. It is said that the proposition is popular in Collingwood and that Capt. Alexander McDougall of Duluth is interested in the project.

Technical Schools.

Purdue University.—Mr. Calvin W. Rice, Electrician for the New York Consolidated Telegraph and Electrical Subway Company and the New York Gas and Electric Light, Heat & Power Company, lectured on Nov. 15th, before the students of Electrical Engineering, at Purdue University, on "The Development of High Tension Service."

The following is a list of those who have agreed to lecture at Purdue University during the present school year, the lectures being given in connection with the course in railroad mechanical engineering: George B. Leighton, President Los Angeles Terminal Railroad, St. Louis, Mo.; R. H. Soule, Baldwin Locomotive Works, Chicago; Martin A. Knapp, Chairman Interstate Commerce Commission, Washington, D. C.; J. Ramsey, Jr., Vice-President and General Manager Wabash Railroad, St. Louis, Mo.; Waldo H. Marshall, Superintendent Motive Power, Lake Shore and Michigan Southern Railroad, Cleveland, O.; William L. Taylor, Attorney General of Indiana, Indianapolis, Ind.; S. P. Bush, Superintendent Motive Power, P. C. & St. L. R., Columbus, O.; H. M. Sperry, Union Switch and Signal Company, New York City; Willard A. Smith, Chief of Transportation Department, Paris Exposition.

Prussian Technical Schools.—Oct. 19 was celebrated the 100th anniversary of the engineering school at Charlottenburg (Berlin), which is thus one of the oldest institutions of the kind in the world, as it is one of the most famous, having had and having in its faculty men of world-wide reputation. The occasion was honored by the presence of the Emperor, who made a speech, in which he declared that this school, like the other Prussian technical institutions, had served its purpose brilliantly, and had won a position equal to that of the universities as an educational instrument of the highest class. In recognition of this, it was announced that thenceforth this and the other Prussian engineering schools have authority to grant degrees. There are to be two of these, ordinary graduates receiving the degree of "Diplom-Ingenieur," equivalent to "Bachelor of Engineering," while, after what we may call a post-graduate course, candidates may receive the degree of "Doctor of Engineering" [Doctor-Ingenieur]. The latter degree may also be conferred "as a rare distinction to men who have rendered distinguished services for the advancement of technical science." On this occasion statues of Krupp and of Siemens were unveiled in the court of the Charlottenburg school.

University of Illinois.—One of the thesis subjects in the Department of Municipal Engineering is "A Comparison of the Methods of Sewage Putrefaction," and for this thesis a study will be made of the efficiency and cost of the principal methods used in inland cities, especially where the streams are not used as sources of water supply. Several new courses are now offered in the Department of Electrical Engineering and the last 1½ years of the four-year course are made elective in three groups. The first takes up the line of work usually taken in regular electrical engineering courses generally offered. The second is an electro-physical course, comprising advanced work in electricity and chemistry. The degree of Bachelor of Science in Electrical Engineering is given on the successful completion of any one of these courses. For the degree of Electrical Engineer five years of work must be satisfactorily completed, the fifth year being devoted entirely to special work in which the principal subjects are selected from the advanced electrical engineering course and the secondary subjects from the advanced courses in mathematics, physics and chemistry and mechanical engineering. Special lines of work are offered in electric traction, electro-metallurgy, alternate-current working and polyphase testing. The equipment of the Electrical Engineering Laboratory is being steadily increased both for regular and advanced work.

University of Michigan.—A graduate school of Marine Engineers and Naval Architecture has been established in the Mechanical Engineering Department, requiring five years' residence at the University. For the first three and a half years the studies are the same as those in the regular engineering courses. The special work begins the second semester of the fourth or senior year and continues through the fifth and last year. The degree of Bachelor of Science in Engineering is given at the end of the fourth year, and at the end of the fifth year the degree of Master of Science in Engineering is given. The new course will begin with the second semester of the present college year and, as arranged, includes 18 hours of class-work in marine engineering and naval architecture and 12 hours of special drawing, making a total of 30 hours for the two subjects in addition to the regular requirements of the engineering course. The Regents have appropriated \$2,000 for the work, of which \$1,600 is for the salary of an Assistant Professor of marine architecture. The marine engineering will be taught by Prof. M. E. Cooley, head of the Department of Mechanical Engineering, who is himself a graduate of the Naval Academy at Annapolis. For the past 18 years the University has offered either a course of study in marine engineering or naval architecture, and the complete course now started is an outgrowth of that work.

River and Harbor Estimates.

The following estimates were made by the Chief of Engineers for river and harbor improvements in Oregon and Washington for the coming fiscal year: Coquille River, \$119,980; Coos River, \$4,500; Tillamook Bay, \$27,000; Upper Columbia and Snake Rivers, \$10,000; Willamette River above Portland and Yamhill River, \$25,000; Columbia River below Tongue Point, \$7,500; Lewis River, \$10,960; Cowitz River, \$5,500; Chehalis River, \$3,000; Puget Sound and tributaries, \$25,000; Olympia Harbor, \$25,000; Swinomish Slough, \$47,000; Okanogan River, \$15,000; Pend d'Oreille River, \$20,000.

The Kansas City, Lawrence and Topeka Electric Railroad.

The Lawrence & Emporia RR., a steam railroad 31 miles long, between Lawrence and Carbondale, Kansas, abandoned March 22, 1894, was sold Oct. 14,

to the Kansas City, Lawrence & Topeka Ry. Co. for \$51,110. The Kansas City, Lawrence & Topeka Ry. Co. held all the bonds of the Lawrence & Emporia, aggregating \$465,000, and also owned the Receivers' certificates and all the indebtedness of the Lawrence & Emporia, which was at one time a part of the Union Pacific. The Kansas City, Lawrence & Topeka has also bought the Lawrence St. Ry. and the Topeka East Side Circle Ry., and the Kansas City, Forest Lake & Topeka Ry., a new electric road on which construction was recently begun. By a combination of all the purchased lines and road now building in between, a complete line will be had between Kansas City and Topeka of 70 miles. The officers of the new company are Henry G. Pert, President, Kansas City, Mo.; Clifford C. Baker, Vice-President, Topeka, Kan.; W. A. Bunker, Treasurer, Kansas City, Mo.; George J. Kensinger, Secretary, Kansas City, Mo.

The K. C., L. & T. was incorporated in the early part of this year, with Willard E. Winner as the principal promoter. The plan is to have an electric railroad from Kansas City, through the Kaw Valley to Topeka, Kan., via Lawrence, which will be used to carry freight as well as passengers. The Leavenworth Construction Co. has been organized to build what road is necessary to connect the purchased lines.

The World's Production of Pig Iron and Steel.

In the following table from the Bulletin of the American Iron and Steel Association, is given the production of pig iron and steel in all countries in 1898 or in the most recent year of which statistics have been received. English tons of 2,240 lbs. are used for Great Britain, Canada, the United States, and "other countries," and metric tons of 2,204 lbs. for all other countries, metric tons being used as the equivalent of English tons in ascertaining the total production of all countries. The statistics of steel production for the United States, Great Britain, France, Belgium, Austria-Hungary, Sweden, Spain and Canada embrace ingots and direct castings, but for Germany and Luxemburg, Russia and Finland, and Italy complete ingot statistics are not available and the statistics for finished steel have therefore been used.

	Pig Iron. Tons.	Steel. Tons.
United States.....	11,773,384	8,932,357
Great Britain.....	8,609,719	4,665,936
Germany and Luxemburg.....	7,232,988	5,779,570
France.....	2,534,427	1,473,100
Belgium.....	979,101	653,130
Austria and Hungary.....	*1,308,423	†880,696
Russia and Finland.....	2,222,469	1,145,758
Sweden.....	531,766	265,121
Spain.....	261,739	213,015
Italy.....	†53,940	†68,755
Canada.....	68,755	21,540
Other countries (about).....	125,226	15,237
Total.....	35,657,000	24,110,000

* For year 1897. † For year 1896.

Boiler Explosion.

A small boiler, used at the West Fortieth Street Shops of the Chicago & Northwestern, Chicago, to furnish steam for a rail saw, exploded November 17. One man was killed and three injured.

Proposals for Deepening Delaware River Channel.

Proposals were received Nov. 20 by Lieutenant-Colonel C. W. Raymond, Corps of Engineers, U. S. A., for dredging the Delaware River Channel to a depth of 30 ft. The bidders were the Virginia Dredging Company, of Richmond, Va.; the Morris & Cummings Dredging Co., of New York, and the American Dredging Co., of Philadelphia. The bids are all within the amount available for the commencement of the work, \$500,000.

Public Works at Tientsin.

Minister Conger sends from Peking, September 1, 1899, a clipping from the North China News in regard to the extensive public works undertaken at the new Russian port of Tientsin. The work as planned will be carried out, about £1,750,000 having already been appropriated for the purpose. Two breakwaters are to be constructed in front of the city, to inclose the new harbor. Within these breakwaters, which are about 2½ miles apart, the harbor is to be dredged and maintained at 30 ft., and a channel is to be dredged and maintained at the same depth from seaward in a northeasterly direction. On the east side will be piers for the use of vessels with passengers and general cargo, the railway being carried along the front of the city, between the bund and the harbor, to these piers, so that passengers will be able to step direct from the steamer into the train. There will be accommodation here for steamers to lie alongside the piers in 28 to 30 ft. of water. There will be a dry dock and a pier for vessels bringing coal, lumber, and other coarse cargoes, a large space between this pier and the western side of the city being reserved for coal yards, lumber yards, etc., branch lines connecting it with the railway. The drainage works and waterworks are now being undertaken, and in the meantime no land will be sold. It is expected that in two years' time the harbor will be made and the city laid out and ready for building, when there will be a great open sale of land.

Chicago Drainage Canal.

Progress on the unfinished sections of the canal near Joliet is not satisfactory, having been still further delayed by the strike by about 200 men employed by Heldmaier & Nue, who demand \$2 a day instead of \$1.75 a day, as at present.

At the request of President Snively of the Illinois & Michigan Canal Commissioners, Judge John A. Grey, of the Circuit Court of Fulton County, Illinois, granted an injunction, Nov. 13, restraining the Trustees of the Chicago Sanitary District from removing the State dams across the Illinois River at Copperas Creek and Henry.

In the U. S. Circuit Court at Chicago, Nov. 13, the Trustees of the Sanitary District filed its answer to the request of the Attorney General of Illinois for an injunction restraining it from opening the Drainage Canal. This is the suit noted in our issue of Nov. 10, p. 784, in which Attorney General Akin is acting for the Illinois & Michigan Canal Commissioners, and which the U. S. Court at Chicago took jurisdiction from the State Court at the request of the Sanitary District. In its answer the Sanitary District sets forth the absolute dependence of the 1,800,000 inhabitants of Chicago on the waters of Lake Michigan for their water supply and the necessity of keeping this free from sewage contamination, and further claims that the mixing of lake water through

the 39th St. conduit of the intercepting sewer system with the Chicago River water will purify the water of the Drainage Canal so that no danger to the valley villages will result. The point is also made that the Illinois & Michigan Canal Commissioners should have made their complaint before, and that it is now too late for them to attempt to interfere with the Drainage Canal, which is necessary for the people of Chicago. It is hoped that the suit can be brought to an early trial and decision.

As we go to press, a conference is being held between the Trustees of the Sanitary District and the Illinois State Canal Commission appointed to investigate and report upon the Drainage Canal, and it was expected that the preliminary report of the State Commission would be presented and discussed.

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works are building five engines for the Lehigh Valley.

The Rogers Locomotive Co. is building five locomotives for the Mexican Central.

The Pittsburgh Locomotive & Car Works are building one engine for the Monongahela River.

The Kentucky Western, now building, will want some rolling stock. (See Railroad Construction column.)

The Baldwin Locomotive Works are said to have an order for two locomotives for the Interoceanic of Mexico.

The Norfolk & Western is said to have ordered four consolidation locomotives from the Baldwin Locomotive Works.

The Illinois Central order for passenger, 10-wheel freight, and switching locomotives will probably be placed this week.

It is reported that the Seaboard Air Line is figuring on a number of locomotives, but we have nothing definite or official.

The Cleveland, Lorain & Wheeling is reported to have ordered seven 10-wheel locomotives from the Pittsburgh Locomotive & Car Works.

It is reported that the Baldwin Locomotive Works have an order for eight two-cylinder compound mastodon freight locomotives for the Fitchburg.

We are informed, but not officially, that the Duluth, Missabe & Northern has ordered eight locomotives from the Pittsburgh Locomotive & Car Works.

We are informed that the Boston & Maine has placed an order with the Manchester Locomotive Works for 14 new locomotives, six switching engines and eight passenger engines.

We are advised by an official of the Erie & Wyoming Valley that the company has not placed an order for additional equipment and does not expect to do so right away, as was reported last week.

Newspapers state that F. F. Whittekin is now in Pittsburgh for the purpose of ordering four locomotives. His title is given as Chief Engineer and General Manager of the Government Railways of the United States of Colombia; his address is Seventh Avenue Hotel.

The St. Louis National Stock Yards have ordered one simple four-wheel switching engine from the Brooks Locomotive Works. It will weigh 80,000 lbs., will have 17 in. x 24 in. cylinders, 50 in. drivers, straight top boilers, working steam pressure 165 lbs., 186 charcoal iron tubes 11 ft. 1 in. long with an outside diameter of 2 in., steel fireboxes 72 in. long and 34 in. wide; tank capacity for water, 3,100 gals.

We have recently noted orders placed for engines by the Delaware, Lackawanna & Western. The Brooks Locomotive Works received an order for 23 simple consolidation engines with improved piston valves, to weigh 205,000 lbs., of which 184,000 lbs. will be on drivers; to have 21 in. x 32 in. cylinders, 54 in. drivers, wagon top type boilers with wide fireboxes, working steam pressure 200 lbs., 410 charcoal iron tubes 13 ft. 10½ in. long, with an outside diameter of 2 in.; steel fireboxes 127 in. long and 97 in. wide; tank capacity for water, 5,000 gals.

The Chicago, Burlington & Quincy is building at its Aurora shops four six-wheel switching engines, with piston valves. They will weigh 120,000 lbs., will have 19 in. x 24 in. cylinders, drivers 52 in. in diam., radial stay boilers, steam pressure 180 lbs.; 204 iron tubes 2½ in. in diam. and 14 ft. 6 in. long; steel fireboxes, 6 ft. long, 4 ft. 6 in. wide; tank capacity for water, 3,900 gals., and for coal, 10 tons. They will be equipped with Westinghouse air brakes, Crandall bell ringers, Monarch brake beams, Chicago couplers, Jerome piston and valve rod packing, Consolidated safety valves, Leach sanding devices, Nathan lubricators, Star Brass Co.'s gages and cast iron wheels with steel tires.

CAR BUILDING.

The Laconia Car Co. is building 25 freight cars for the Maine Central.

The Pecos Valley & Northeastern is in the market for 300 stock cars.

The Virginia & Southwestern is in the market for 500 coal, coke, flat and box cars.

We are informed that the Kansas City, Memphis & Birmingham will order 500 60,000-lb. box cars.

We understand that the White Pass & Yukon is building 80 box and stock cars and 20 flat cars.

Pullman's Palace Car Co. is building four composite cars for the Atchison, Topeka & Santa Fe.

The Kansas City, Pittsburgh & Gulf has ordered 1,500 box cars from the American Car & Foundry Co.

The Kentucky Western, now building, will want some rolling stock. (See Railroad Construction column.)

The Atlantic, Valdosta & Western is reported in the market for 200 box cars, but we have no official information.

The Russell Snow Plow Co. is having two cars built at the Huntington works of the American Car & Foundry Co.

We understand that bids for the Chicago & Eastern Illinois box cars, noted in our issue of Nov. 3, will be received Nov. 24.

It is reported that the Seaboard Air Line is figuring on a large number of freight cars, but we have nothing definite or official.

We are reliably informed that the Southern is in the market for 650 box cars, 1,000 gondola cars and about 500 flat and stock cars.

It is understood that the Kansas City, Pittsburgh & Gulf will order a large number of cars as soon as the reorganization is completed.

The Michigan Central is ready to buy materials for about six cars for passenger service, to be built at its Detroit shops early in the year.

The Chicago, Burlington & Quincy is building, at its Aurora shops, 200 more furniture cars like the 200 noted in our issue of June 9 last.

We are informed that the Chicago & Alton will order 1,700 cars more, including 1,200 of 60,000 lbs. capacity and 200 of 80,000 lbs. capacity.

It is reported, but not officially, that the Ann Arbor has ordered 200 coal cars of 80,000 lbs. capacity from the American Car & Foundry Co.

The 300 stock cars ordered by the Chicago & Alton from the Mt. Vernon Car Mfg. Co., as noted last week, will be 36 ft. long and of 60,000 lbs. capacity.

The New York, New Haven & Hartford has placed an order with Pullman's Palace Car Co. for eight parlor and two combination buffet and baggage cars.

The Chesapeake & Ohio is considering 1,000 or 2,000 coal cars of 80,000 lbs. capacity, and the order will probably be let after January 1st for delivery about June.

We are officially informed that the Merchants' Despatch Transportation Co. is not in the market for 400 refrigerator cars, as was reported by a contemporary.

The Chicago, Milwaukee & St. Paul has ordered the six sleepers and 40 coaches noted Oct. 20. The order was divided between Barney & Smith and Pullman's Palace Car Co.

We are advised by an official of the Erie & Wyoming Valley that the company has not yet placed an order for additional equipment and does not expect to do so right away.

The Pittsburgh & Lake Erie has ordered two coaches and one baggage car from the Harlan & Hollingsworth Co. We noted, Oct. 13, that this road would order passenger cars.

Some of the car builders have been asked to bid on between 200 and 300 refrigerator cars for export, and it is expected that the order will shortly be placed through a firm in New York City.

We are informed, but not officially, that Pullman's Palace Car Co. has an order for 21 cars for passenger service for the Union Pacific, consisting of baggage, mail, dining and combination cars. (See Sept. 29.)

J. W. Ellsworth & Co., of Cleveland, O., have placed an order with the Barney & Smith Car Co. for 500 coal cars, to be built from Pennsylvania R.R. specifications. Three hundred of the cars are for a railroad in Canada.

Newspapers state that F. F. Whittekin, Chief Engineer & General Manager of the Government Railways of the United States of Colombia, is in Pittsburgh for the purpose of buying 200 freight cars. The address given is the Seventh Avenue Hotel.

The Chicago & Alton has ordered 300 more stock cars from the Mount Vernon Car Mfg. Co. in addition to the 300 noted last week, and has also ordered 800 steel cars of 100,000 lbs. capacity from the Pressed Steel Car Co., instead of 500, as noted Nov. 3.

We are officially informed that the Missouri Pacific does not contemplate ordering any more cars as reported by one of the railroad papers last week. This road has recently received 1,000 box cars, ordered several months ago from the American Car & Foundry Co., and will soon begin to receive the 1,000 box and 300 coal cars noted in our issues of Oct. 27 and Nov. 10.

The cars ordered by the Pittsburgh, Shawmut & Northern from the Barney & Smith Car Co., referred to Nov. 17, will be box cars of 60,000 lbs. capacity, for December delivery. They will measure 36 ft. 6½ in. long, 8 ft. 6 in. wide, and 6 ft. 8½ in. high, and have oak bolsters with Filch plates, Sterlingworth brake beams, Westinghouse air brakes, bronze lead-lined brasses, Gould No. 3 couplers, Dunham doors with McGuire grain door fastenings, M. C. B. cast iron journal boxes with pressed steel lids, galvanized iron roofs and rigid diamond trucks with 33-in. cast iron wheels.

In our issues of Nov. 3 and 10 we noted orders placed by the Hocking Valley with Pullman's Palace Car Co. for 1,050 box cars and 50 coal cars. The box cars will be of 60,000 lbs. capacity, 38 ft. 4½ in. long over end sills, 8 ft. 4½ in. wide inside and 7 ft. 9 in. high from floor to car line, and will weigh 33,500 lbs. The coal cars will be of 80,000 lbs. capacity, 36 ft. long over end sills, 9 ft. 8½ in. wide over side sills and with car bodies 3 ft. 7 in. high, and to weight 33,000 lbs. These cars are for March and April delivery and all will have diamond trucks, Simplex bolsters, Monarch solid brake beams, New York air brakes, Buckeye couplers, Detroit springs, Hoey's patent draft rigging, Timms dust guards, M. C. B. standard brasses and journal boxes, and pressed steel journal box lids and Hocking Valley standard paint. The box cars will have steel axles, Security car doors with Dayton malleable iron fastenings, McGuire grain doors, Excelsior roofs and Congdon brake shoes. The coal cars will have hammered scrap iron axles, and Christie brake shoes.

BRIDGE BUILDING.

BALTIMORE, MD.—The Baltimore County Commissioners have approved the plans of the Baltimore & Potomac R.R. for a bridge over Wilkens Ave. Several months ago a contract was let to the Wrought Iron Bridge Co. for this structure. The railroad company now agrees to build it at its own expense.

The B. & P. RR. has applied to the county commissioners for permission to build a bridge on Washington Road to do away with a grade crossing.

BOSTON, MASS.—Colonel Chas. R. Suter, Corps of Engineers, Boston; Major D. W. Lockwood, Corps of Engineers, Portsmouth, N. H., and Major W. L. Fiske, Corps of Engineers, Newport, R. I., have been appointed a Commission by the Secretary of War to hear petitions in regard to, and report upon, the advisability of building the Cove St. Bridge.

City Engineer Wm. Jackson, Nov. 13, received the following bids for building a temporary wooden bridge around the Balden bridge across the Mystic River while a new bridge is being built: Benj. Young, \$28,867; W. J. Lawler, \$29,293; Geo. Hayes & Co., \$29,950; Wm. H. Ellis & Co., \$32,543.

The Railroad Commissioners, according to report, have approved the petition of the Park Commissioners for a bridge across the Revere Beach & Lynn RR. on Crest Ave., Revere. (July 14, p. 512.)

BROOKLYN, N. Y.—The Committee on Bridges and Tunnels of the Board of Aldermen will report next Tuesday on the ordinance authorizing a new bridge over Newtown Creek from Grand St., in the Borough of Brooklyn, to Grand St., in the Borough of Queens. The estimated cost of this bridge is \$200,000.

CARUTHERSVILLE, MO.—The St. Louis, Caruthersville & Memphis RR. will need an 800-ft. and a 400-ft. trestle at Grossy Bayou, and one of 144 ft. at Penirs Cot Bayou. I. H. Burgoon, Gen. Supt.

CEDAR BLUFF, ALA.—Reports state that at a meeting of the Commissioners of Cherokee County, the contract recently let to the Converse Bridge Co., of Chattanooga, Tenn., to build a steel bridge over the Coosa River, at \$27,500, was rescinded.

CHEHALAIS, WASH.—The contract for building a bridge across the Chehalis River at Chehalis was let Nov. 11 to the Seattle Bridge Co. at \$7,500. The structure is to be a steel combination with cylinder piers.

CHICAGO, ILL.—Reports state that the City Engineer will advertise for competitive plans for bridges to replace those at Davison St., Wood St., Claybourn Pl., and Ninety-fifth St.

City Engineer Ericson has received the report of Edward Bates, Superintendent of Bridges and Buildings of the Chicago, Milwaukee & St. Paul, on the condition of bridges at Davison St., Claybourn Pl. and Weed St. The bridges are said to be beyond repair.

Mayor Harrison, according to report, has received from the Chicago, Burlington & Quincy a request to modify the plans of the viaduct to be erected at Canal St. over the tracks in Sixteenth St.

CORVALLIS, ORE.—It is stated that the combination bridge to be built across Long Tom Creek, Benton County, will cost about \$5,000. The County Court has not decided as to the style, whether it shall be a draw or high bridge. Virgil E. Watters, County Clerk. (Oct. 27, p. 750.)

COUNCIL BLUFFS, IA.—C. E. H. Campbell has the contract for the Omaha & Council Bluffs Ry. & Bridge Co.'s bridge over Indian Creek, at \$3,500. It is a double-track steel structure.

DANIELSON, CONN.—Plans have been prepared by Warden Palmer for a bridge with a double driveway across the Five-Mile River. The plan contemplates a bridge 16 ft. wide and 310 ft. long with eight spans 30 ft. long and one across the channel of 70 ft. The entire cost of the bridge will be about \$2,510.

DENVER, COLO.—The State of Colorado will, early in the coming year, prepare estimates and plans for two steel bridges for which appropriations have already been made. The work this year has been devoted to State roads and small wooden bridges.

DIXON, KY.—The Kentucky Western Ry., now being built by the Southern Construction Co. of St. Louis, Mo., will let sub-contracts for bridges, pile-driving, trestles, etc. We are told that there are a large number of trestles required for this road.

ELGIN, ILL.—An ordinance appropriating \$30,000 for a bridge at Chicago St. is said to have been passed. A. E. Price, Mayor.

GUNTERSVILLE, ALA.—The Commissioners of Marshall County will build an iron bridge across Short Creek near Guntersville.

An iron bridge, with a main span of 80 ft., will be let in the spring by Marshall County, to span Town Creek, on the Langston and Guntersville Road. It will have wooden approaches.

HAMBURG, N. Y.—Proposals will be received by W. E. Hoyt, Chief Engineer of the B. & P. Ry. Co., at Rochester, N. Y., until Nov. 27, for building a steel bridge and abutments on Abbott Road in the towns of Hamburg and East Hamburg, N. Y. The bridge will be a single track structure of 35 ft. span.

HAMILTON, ONT.—The Cataract Power Co., controlling several electric railroads and electric power companies, has submitted to the City Council a proposition for an extension of one of the railroads which will require two bridges near the city of Hamilton—one over the Grand Trunk tracks and the other over a canal. The latter structure will be about 750 ft. long. Bridges will probably be required at Guelph and Galt.

HARTFORD, CONN.—The following committee has been appointed to act with the Bridge District Board for a new bridge over the Connecticut River: Alderman Richard J. Kinsella, Councilman Louis R. Cheney and A. J. Meyer, Francis H. Richards, C. E. Joseph H. Twichell and Superintendent C. S. Davidson of the Consolidated Road.

HUNTINGTON, W. VA.—The Guyandot Valley Ry. Co., J. L. Caldwell, President, will receive proposals until Nov. 28 for trestle work and bridges on the 20 miles of road, as advertised in The Railroad Gazette.

INDIANA, PA.—The viewers have recommended a bridge over Black Lick Creek in Conemaugh Township. James A. Crossman, County Clerk.

KESWICK, CAL.—The County Clerk has been instructed to advertise for bids for a bridge to span the Sacramento River at Keswick. It will be a Howe truss structure. A. J. Dryman, County Clerk. (Aug. 11, p. 572.)

LOCKPORT, ILL.—Proposals for supplying and building the superstructure for a bridge over Bear Trap Dam will be received until Jan. 3 by the Board of Trustees of the Sanitary District of Chicago. Wm. Boldenweck, President; Jos. F. Haas, Clerk, Chicago.

MEDIA, PA.—The Philadelphia & Delaware County Trolley Co., in consideration for a right of way on Washington St., in Media, will build an iron bridge over Ridley Creek.

MEMPHIS, TENN.—The Yungtown Bridge Co. has the contract for the iron bridge across the Wolf River at \$5,800. The bridge will have two spans—one 125 ft. and the other 100 ft.; also for an iron approach of 125 ft. (Nov. 10, p. 785.)

MONROE, MICH.—A bridge, according to report, is proposed on Monroe St. Specifications are being prepared.

NEW BERN, TENN.—The bridge proposed by Dyer County over the Obion River, 12 miles west of New Bern, will cost about \$6,000. The bridge will be a steel structure, 160 ft. long. H. C. Porter is chairman of the committee. (Nov. 19, p. 785.)

NEW HAVEN, CONN.—N. W. Kendall, President of the Quinnipiac Brewing Co., has petitioned the Board of Councilmen for a bridge at Bridge St. crossing, near Bell dock. The proposed bridge is to span the Consolidated Road.

NORRISTOWN, PA.—A bridge will be built over the Perkiomen River in Upper Salford.

ORCHARD LAKE, MICH.—The Detroit & Northwestern Ry. will receive bids, about Jan. 1, for a combination bridge of about 600 ft., to cross the Grand Trunk Ry.

ORONO, ME.—The Maine Central RR. has decided to replace the bridge at Orono by an iron structure. Thomas L. Dunn, Chief Engineer, Portland. (Oct. 13, p. 717.)

OSWEGO, N. Y.—Reports state that a new bridge to replace the present lower bridge is in contemplation at a cost of about \$10,000.

PATTON, PA.—The viewers appointed in the matter of an iron bridge across Little Chest Creek in Patton Borough, Cambria County, have reported favorably.

PEMBROKE, ONT.—The Public Works Committee of the Council has recommended that bids be asked for building a Howe truss bridge in place of the present structure at Mary St. The plans for the new bridge were made by J. L. Morris.

ST. LOUIS, MO.—Nov. 24 is the date set for receiving proposals for supplying the steel necessary for a railroad bridge over Maline Creek. Robert E. McMath, President of the Board of Public Improvements.

SACRAMENTO, CAL.—The estimated cost of the proposed bridge across Georgiana Slough at Walnut Grove is between \$12,000 and \$14,000. County Surveyor J. C. Boyd says the bridge will not be built this year.

SENECA FALLS, N. Y.—Press reports state that plans have been completed for the proposed Rumsey St. bridge which requires a structure with two over head truss spans 119 ft. long over the river and the canal; also a plate girder span over the Lehigh Valley RR. The estimated cost of the entire work is \$30,000. (Nov. 10, p. 785.)

SYRACUSE, N. Y.—Press reports state that plans for a steel bridge proposed across the Erie Canal at Catharine St. have been approved by the State Canal Board, and that it is expected that the Public Works Department will soon ask for bids. Edward A. Bond, State Engineer, Albany.

TOLEDO, O.—Reports state that a new bridge is wanted between Ontario and Washington streets.

UNIONTOWN, PA.—The Pennsylvania RR. will need several small girder bridges on the extension of the Coal Lick Run branch of the Southwest Pennsylvania Ry.

WAVERLY, N. Y.—We are told that the proposed bridge across the Erie and Lehigh Valley RR. tracks is on the extension of Spaulding St. It will be of steel and cost about \$8,000. (Nov. 10, p. 785.)

WILKES BARRE, PA.—In addition to the appropriation made for bridges by the Grand Jury for Luzerne County, mentioned last week, appropriations have been made for three other iron bridges, and 20 stone arch structures, varying in cost from \$125 to \$800. The plans and specifications for the bridges between Kingston and Wilkes Barre, mentioned last week, are to be prepared at once and bids will be asked as soon as they are completed. The other bridges will be advertised and bids received by the County Commissioners and Comptroller about May or June, 1900. The plans for all structures will be under the supervision of H. S. Smith, Engineer.

Other Structures.

BALTIMORE, MD.—The Secretary of the Treasury has asked for designs for the new Custom House to be built in Baltimore. The new building will cost about \$1,500,000.

BELLVILLE, TEX.—In connection with a division yard being built at this place by the Gulf, Colorado & Santa Fe, a 16-stall stone engine house, sand house, 30-pocket coal chute, and reservoir with water tank, columns, etc., will be built.

CHICAGO, ILL.—It is reported that the Grand Trunk will replace the elevator at Homan Ave. and West 49th St., burned last month, and that a permit has been issued for building an elevator and boiler house to cost \$50,000.

A permit has been issued to the Chicago Telephone Co. for a 2-story brick station at 6308-10 State St., to cost \$25,000.

It is said that Charles Fink and John McLaughlin will build at South Chicago on the sites of buildings recently destroyed by fire.

It is reported that Eastern capitalists are negotiating for land near Washington Park on which to build a hotel to cost about \$1,000,000.

Permits have been issued to the Northwestern Elevated Ry. for 17 station buildings on its line to be built of brick, one story high, and to cost \$3,000 each. They will be located at Chicago Ave., Division, Schiller, Sedgwick, Larrabee, North Halsted and Center Sts., Webster, Fullerton and

Wrightwood Aves., Diversey Boulevard, Wellington St., Belmont Ave., North Clark, Addison and Grace Sts. and Sheridan Road.

The Chicago Flour Co. will build a brick warehouse at the southwest corner of 39th and Wallace Sts., to cost not less than \$10,000. E. E. Giddings is President of the Company.

John Sloane & Co. of New York have leased from the Rutter Estate the lot at the northwest corner of Wabash Ave. and Madison St. for 99 years at a rental of \$30,000 a year. The ground fronts about 71 ft. on Wabash Ave. and 150 ft. on Madison St. and was occupied by A. C. McClurg & Co., publishers, until last winter, when the building was destroyed by fire. The lessee will build a modern fireproof building not less than eight stories high to cover the entire lot. It is understood that the building will be built by Mandel Bros., whose large retail store is already on both sides of the site.

The plans for a hospital at Division St. and North 48th St. have been made by Richard E. Schmidt. It is to cost about \$150,000. Adam J. Rasper, President of building committee.

DES MOINES, IA.—The Chamberlain Medicine Co. will place a new factory building on the corner of Park St. and Sixth Ave. The building is to be three or four stories high, of brick and steel, and will be 198 ft. x 120 ft. Estimated cost, \$50,000.

FLORENCE, ALA.—A \$28,000 court house is said to be in consideration by the County Commissioners.

HONESDALE, PA.—The Delaware & Hudson Co. has let a contract to Conrad Schroeder of Scranton, Pa., for a new station at Front and Ninth Sts., in Honesdale. It will be three stories high, 25 ft. wide and 80 ft. long, and built of stone and brick. Work will be begun at once. The estimated cost is \$10,000. A. W. Fulter of Albany, N. Y., is the architect.

JACKSON, MISS.—Bids will be opened by the Treasury Department Dec. 21, for building the extension to the U. S. Court House and Post-office building at Jackson. Specifications can be had from the Postmaster at Jackson, or from James Knox Taylor, Supervising Architect, Washington, D. C.

LANCASTER, PA.—Plans are being prepared, according to report, by C. E. Urban, of Philadelphia, for a new hall for the Franklin and Marshall College at Lancaster. It will be a fire-proof structure and probably cost \$30,000.

MEMPHIS, TENN.—Plans and specifications have been prepared for a 10-story office and apartment building corner of Madison and Main Sts., to be built of steel and stone.

NASHVILLE, TENN.—Capitalists of this city want plans for an 8-story apartment house to be erected corner of West End Ave. and Broad St. of iron and stone, with all the latest conveniences of heating, lighting and elevator service.

NEW YORK, N. Y.—A 12-story granite and iron addition will be built to the stores of Charles Broadway Rouse at 553 Broadway. Mr. W. J. Dilthey, 3 Union Square, is the architect.

S. E. Jacobs, of 35 Nassau St., will build a six-story brick storage house at 111 Seventh St. A similar structure will be built at No. 115. H. Regelmann is the architect. Each structure is estimated to cost \$12,000.

Plans were filed during the week with the Building Department for a new six-story and warehouse building for Adams & Co. It will cover the whole block on Sixth Ave. between 21st and 22d Sts., and cost about \$750,000.

An eight-story brick office and loft building will be built at 11 East 22d St., by Wm. H. Stearns of 7 West 118th St. Mr. C. H. Rich is the architect. The cost is placed at \$90,000.

Daniel A. Loring, reports state, contemplates building a 14-story hotel at Central Park West and 91st St. The old building at the southeast corner of Broadway and Thirteenth St. will be removed next May and a 10-story store and loft building built in its place from plans by R. Maynicke.

PHILADELPHIA, PA.—Reports state that a new armory building for the First City Troop will be built at Twenty-third St., above Chestnut St. It is to have a frontage of 98 ft. and will be about 240 ft. long. Bailey & Truscott are the architects.

Plans are being made by William Macauley, of this city, for a seven-story fire-proof building, which will cost about \$250,000.

Competitive plans and specifications are being submitted to the board of directors of the Philopatrian Institute, of this city, for a new building of stone, brick and iron.

The Baldwin Locomotive Works has not definitely decided if it will rebuild the old building at Broad St. and Pennsylvania Ave. (Nov. 17, p. 798.)

PROVO, UTAH.—Reports state that a union station will be built at this place for the Oregon Short Line and the Rio Grande Western. The present stations of these roads are about 200 ft. apart.

SAN FRANCISCO, CAL.—The Atchison, Topeka & Santa Fe has been granted permission by the Treasury Department to build another bonded warehouse on Beale St. The cost is estimated at \$75,000.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Alabama & Great Southern.—Preferred 3 per cent., payable in December.

Boston & Albany.—Quarterly, 2 per cent., payable Dec. 30.

Boston & Maine.—Quarterly, common 1½ per cent., payable Jan. 1.

Central Massachusetts.—Semi-annual, preferred, 75 cents per share, payable Dec. 1.

Chicago & Alton.—Quarterly, preferred 2½ per cent., common 3 per cent., both payable Dec. 27.

Chicago, Burlington & Quincy.—Quarterly, 1½ per cent., payable Dec. 15.

North Pennsylvania.—Quarterly, 2 per cent., payable Nov. 25.

Pacific Mail Steamship Co.—Semi-annual, 1½ per cent., payable Dec. 1.

Pittsburgh, Bessemer & Lake Erie.—Semi-annual, 3 per cent.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the Society, 220 W. 57th St., New York City, on the first and third Wednesdays in each

month, at 8 p. m. C. W. Hunt, Secretary, 220 W. 57th St., N. Y. City.

American Society of Mechanical Engineers.—Meets at 12 W. 31st St., New York City, on the first Tuesday of each month from October to June, except December. F. R. Hutton, Secretary. The date set for the approaching convention is Dec. 5 to 8, 1899.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7.30 p. m. S. E. Tinkham, Secretary, City Hall, Boston.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield St., Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 10 a. m. Harry D. Vought, Secretary, 114 Fifth Ave., N. Y. City.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month. Arthur A. Skeels, Secretary.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 36 Jacobson Bldg., Denver, Colo., on the second Tuesday of each month except June, July, August and September. W. B. Lawson, Secretary.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth St., on the third Tuesday of each month, excepting July and August, at 6.30 p. m. J. F. Wilson, Secretary, P. O. Box 333, Cincinnati, O.

Engineers' Club of Columbus (O.).—Meets at 12½ North High St. on the first and third Saturdays from September to June. H. M. Gates, 12½ N. High St., Secretary, Columbus, O.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month. H. E. Smith, Secretary, 1620 S. E. Fourth St., Minneapolis.

Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard St., Philadelphia, Pa., on the first and third Saturdays of each month at 8 p. m., except during July and August. L. F. Rondinella, Secretary.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth St. and Lucas Place, St. Louis, on the first and third Wednesdays in each month. Richard McCulloch, Secretary, 240 N. Spring Ave., St. Louis.

Engineering Association of the South.—Meets in the Berry Block, Nashville, Tenn., on the second Thursday of each month. H. M. Jones, Secretary, 1000 Broad St., Nashville.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building. H. J. Marsh, Secretary.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn Ave., Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m. R. A. Fessenden, Secretary.

Franklin Institute.—Meets at 8 p. m. on the third Wednesday of each month, except July and August, at 15 S. Seventh St., Philadelphia, Pa. Wm. H. Wahl, Secretary.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn St., Chicago.

Louisiana Engineering Society.—Meets on the second Monday of each month at 8 p. m., at 712 Union St., New Orleans, La. J. F. Coleman, Secretary.

Montana Society of Civil Engineers.—Meets in Butte, Mont., on the third Saturday in each month at 7.30 p. m. A. S. Hovey, Secretary.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month. Edward L. Janes, Secretary, P. O. Box 1158, Boston, Mass.

New York Railroad Club.—Meets at 12 W. 31st St., New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August. W. W. Wheatley, Secretary, 168 Montague St., Brooklyn.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul. T. A. Foque, Secretary, "Soo Line," Minneapolis, Minn.

Northwest Track & Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

Railway Signaling Club.—Meets on the second Tuesday of January, March, May, September and November. C. O. Tilton, Secretary, C., M. & St. P. Ry., West Milwaukee, Wis.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m. H. H. Roberts, Secretary, 512 Commercial Bldg., St. Louis.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November. S. A. Charpiot, Secretary, Savannah, Ga.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market St., San Francisco, Cal., on the first Friday in each month, at 8 p. m. Otto Von Geldern, Secretary.

Texas Railway Club.—Meets on the third Mondays of February and August, at place and time chosen at the previous meeting. The next meeting will be held in Austin, Tex., in February, 1900. T. H. Osborne, Secretary, Pine Bluff, Ark.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, Ill., on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

Western Railway Club.—Meets on the third Tuesday of each month except June, July and August, in the Auditorium Hotel, Chicago, Ill. J. W. Taylor, Secretary, 667 Rookery Bldg., Chicago.

Western Society of Engineers.—Meets in the Club rooms in the Monadnock Block, Chicago, Ill., on the first Wednesday of each month, except in January. Special meetings are held on the third

Wednesday of each month. Nelson L. Litten, Secretary.

St. Louis Railway Club.

At the meeting of this club on Friday, Nov. 18, L. P. Breckenridge, Professor of Mechanical Engineering University of Illinois, presented a paper on "The American Technical School and its Relation to Railways."

Western Society of Engineers.

The Western Society of Engineers visited the Lewis Institute, Chicago, Tuesday afternoon, November 21. In the evening an informal dinner was given by the faculty, after which the working of the night-school was shown. There are now enrolled over 900 students in the night classes.

Southern and Southwestern Railway Club.

At the annual meeting of the Southern & Southwestern Railway Club the following officers were elected: President, W. E. Symons, Superintendent of Motive Power, Plant System; First Vice-President, W. L. Tracy, Master Mechanic, Southern Railway at Atlanta; second Vice-President, J. T. Robinson, Master Mechanic of the Southern at Selma, Ala.; Treasurer, E. C. Spalding, Atlanta; Secretary, W. A. Love, Atlanta.

International Association for Testing Materials.—American Section.

A meeting of the Executive Committee was held at the Engineers' Club, Philadelphia, Pa., on Saturday, Oct. 21, 1899, at 3.30 p. m. There were present Messrs. Merriman, Henning, Kreuzpointner and Humphrey. A letter was read from Vice-Chairman Howe regretting his inability to be present.

The Treasurer reported that contributions to the Publication and Research Fund had been received by him to the amount of \$395. He also reported that others had promised to subscribe later.

It was decided to provisionally appoint the third annual meeting to be held in New York City between June 20 and June 30, 1900, the assignment of the exact date being deferred until the meeting of the Executive Committee in January, 1900.

Corporations or persons desiring to subscribe to the Publication and Research Fund are invited to send their contributions to the Treasurer of the American Section, Paul Kreuzpointner, P. R. R. Testing Laboratory, Altoona, Pa. Information in regard to the objects of the Association will be given by him.

New York Railroad Club.

The meeting of the New York Railroad Club, held Thursday evening, Nov. 16, was the annual meeting and election of officers for the coming year. The following were elected:

President, H. H. Vreeland, President of the Metropolitan Street Railway Co. (re-elected); First Vice-President, C. M. Mendenhall, Superintendent Motive Power, Philadelphia, Wilmington & Baltimore; Second Vice-President, Samuel Higgins, Superintendent Motive Power, Lehigh Valley R. R.; Third Vice-President, D. B. McCoy, Division Superintendent, New York Central & Hudson River; Treasurer, C. A. Smith, Master Car Builder, Union Tank Line Co. Executive Committee: W. W. Snow, Vice-President, Ramapo Iron Works; G. W. West, Superintendent of Motive Power, New York, Ontario & Western; A. E. Mitchell, Superintendent of Motive Power, Erie. Finance Committee: R. M. Dixon, Engineer, Safety Car Heating & Lighting Co.; D. M. Brady, President, Brady Metal Co.; Wm. B. Albright, Sherwin Williams Co.

The present membership of the club is 916, the net gain during the last year having been 90.

Professor Scripture of Yale University presented a paper on "Color Blindness," which will appear in due time in the Proceedings of the club and of which we shall attempt no abstract now. Professor Scripture did not read his paper, but gave the substance of it in the form of a lecture, and he succeeded in making the subject most attractive to his listeners not only because of the manner of its presentation, but because of the very practical conclusions to which he had come. The paper was discussed by Dr. Williams of Boston, whose writings on this topic are more or less well known to our readers and who was for some years on the Burlington. It was also discussed more or less by several members of the club and the President said that for the first time in his experience he was obliged to stop the discussion because of the lateness of the hour.

Engineers' Club of Cincinnati.

The 109th regular meeting of the club was held on October 19th, Vice-President Punshon in the chair. Mr. David Goldfogle read a paper on "Some Details of Two Sewer Tunnels."

The first part of the paper comprised a description of the construction of a brick sewer, 11 ft. in diameter, about 300 ft. in length, which was tunneled through the embankment supporting the Miami Canal at a point a short distance south of the Mitchell Ave. aqueduct. At this point there existed an old stone culvert, semi-circular in shape, from 5½ to 6 ft. in height and about 2 ft. in width at the bottom, which had been built at the time of the construction of the canal. This old culvert, which was in very bad condition, had for its foundation a layer of hewn oak logs about 10 in. by 12 in., laid close together and extending a short distance beyond the sides of the culvert. The new sewer was so located with reference to the old culvert that its bottom was about 8½ ft. below the top of the old timber floor at the west end and about 5½ ft. at the east end. A wooden flume was constructed on top of the old timber floor to convey the creek water during the construction of the lower half of the sewer. When this lower half was completed for the entire length up to the timber floor, the old culvert being supported in the meantime by means of wooden struts and beams as the work progressed, the water was turned into it, the timber floor cut away in section, and the upper half of the circular sewer built inside of the old culvert, beginning at the middle and working each way. The space between the top of the new sewer and the inside of the old culvert was filled in solidly with brick work. The total cost of the work to the contractor was about \$22 per lineal foot of sewer. The second part of the paper was devoted to a description of the construction of a tunnel for a sewer pipe 16 in. in diameter. The material encountered is blue shale and stone requiring blasting for its removal, and was conveyed to the surface through shafts, in some of which brick manholes were built, the others being used simply for the purpose of facilitating construction, and are filled in after the work was completed. Af-

ter the pipe was laid the tunnel was filled up with concrete to the top of the pipe and the excavated material laced back on top of the pipe completely filling the tunnel.

American Society of Mechanical Engineers.

The annual meeting of the society will be held at 12 West 31st Street, Dec. 5 to 8, inclusive. The convention will be opened at 9 p. m. on Tuesday evening, when Admiral George W. Melville will deliver his annual address as retiring President of the Society. Professional papers will be read as follows:

Wednesday Morning, 10 o'clock.

Report of the Committee on the Revision of the Society Code of 1885, relative to a Standard Method of Conducting Steam Boiler Trials, and discussion on report. R. H. Thurston. The Steam Engine at the End of the XIX Century.

C. V. Kerr. Berthier Method of Coal Calorimetry. L. A. Laird. Test of Two Pumping Engines at St. Louis Water Works.

H. T. Eddy. New Graphic Method of Constructing the Entropy-Temperature Diagram of a Gas or Oil Engine. Geo. M. Peek. Pressure in Pipe Due to Stoppage of Flowing Liquid.

Wednesday Evening, 9 o'clock.

A. L. Rice. Liquefaction of Gases. P. M. Chamberlain. Curved Glass Blue Print Machine, and a Metal Dynagraph.

M. P. Higgins. Education of Machinists, Foremen and Mechanical Engineers.

Thursday Morning.

Herman Poole. Expt. on Using Gasoline Gas for Boiler Heating.

C. H. Benjamin. Friction of Steam Packings. F. C. Wagner. Friction Tests of a Locomotive Slide Valve.

A. J. Frith. Note on Fly-Wheel Design. James McBride. A Broken Fly-Wheel, and How it Was Repaired.

C. H. Robertson. Efficiency Test of a 125-H.-P. Gas Engine.

J. F. W. Harris. Strength of Steel Balls. M. White and F. W. Taylor. Colors of Heated Steel at Different Temperatures.

Friday Morning, 10.30 o'clock.

W. J. Keep. Impact. H. J. Conant. The Southern Terminal at Boston.

F. H. Stillman. High Hydrostatic Pressures, and Their Application to Compressing Liquids. A New Form of Pressure Gage.

G. I. Rockwood. The Value of a Horse-Power.

The usual arrangements have been made for the entertainment of the members and for the social gatherings. Wednesday afternoon is left open for inspection trips and on Thursday afternoon the power plant of the Waldorf-Astoria Hotel will be visited. The reception and conversation at Sherry's, 44th Street and Fifth Avenue, will be held Thursday evening. The usual arrangements have been made for the reduced rate of 1/3 fare for the round trip for those attending the meeting. Full particulars may be obtained from the printed announcement sent out by the Secretary. Cincinnati, O., is being considered as the probable place for the spring meeting of 1900. Mr. Charles H. Morgan has been nominated for President to succeed Admiral Melville.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. William H. Stetson, Assistant Chief of the Eastern Division of the Postal Telegraph Cable Co., died of pneumonia at St. Joseph's Hospital, Chicago, Nov. 14.

—Mr. T. W. Lee, General Passenger Agent of the Delaware, Lackawanna & Western RR., and Miss Ma Belle Burnett of Syracuse, N. Y., were married on Nov. 11.

—Mr. Thos. J. Hunter, until recently Auditor of the Atlanta & West Point (see E. & A., p. 786) is reported missing, and he has been indicted for embezzlement.

—Mr. J. J. Evans, Chairman of the Mississippi Railroad Commission, died at his home in Aberdeen, Miss., Nov. 20, from pneumonia. Mr. Evans was fifty-eight years old.

—Mr. D. A. Sheedy, who recently resigned as Superintendent of Bridges and Buildings of the Central Vermont (see E. & A., p. 799), has accepted his old position as Superintendent of Erection for the Edge Moor Bridge Works. Mr. Sheedy is now in Boston arranging for erecting of the new Elevated RR., at that place.

—Vice-President Garrett A. Hobart died at his home in Paterson, N. J., on Tuesday morning last, after an illness of several months. A brief sketch of his life, including his connection with railroad interests, was given in these columns three weeks ago. Members of his family say that of all the honors that came to Mr. Hobart in business life, he himself found the most gratification in the appointment to the Board of Arbitration of the Joint Traffic Association.

—Mr. Henry J. Fillman, Division Ticket Agent of the United RR.'s of New Jersey Division of the Pennsylvania RR., died Nov. 14 at Bordentown. Mr. Fillman was born in Montgomery County, Pa., in 1843 and entered the railroad service in 1869 as Clerk on the Erie RR. In 1872 he was appointed Chief Clerk of Foreign Tickets of the Pennsylvania, and one year later he became General Ticket Agent of the U. RR. of N. J. D., which position, under the title of Division Ticket Agent, he held until his death.

—Sir Richard Moon, formerly Chairman of the London & North Western Railway, died last week. He retired from active service in 1891, having been Chairman of the company for 30 years, and having been in the constant service of the company for 40 years. He was one of the strong characters of the British railroad service, having devoted himself all of his active life with great ability and with absolutely single-mindedness to the affairs of his company. He was born in 1815 and was made a Baronet in 1887.

—Mr. Albert S. Adams, who was Master Mechanic of the Boston & Worcester RR., for eight years between 1850 and 1860, died at Newton, N. H., on Nov. 8, at the age of 83. Mr. Adams designed the "Express" and the "Dispatch," two famous passenger locomotives in their day; and it was during his administration that bituminous coal was first used as a fuel for locomotives in Massachusetts. He was a prominent member of the old New England Master Me-

chanics' Association, which was composed of such men as John B. Winslow, Wilson Eddy, George Griggs and John Kimball.

—Mr. Sylvanus Howe Sweet, formerly State Engineer and Surveyor of New York, died Nov. 20, at Central Square, N. Y. Mr. Sweet was a grandson of Dr. Caleb Sweet, a surgeon of the First New York Infantry in the War of the Revolution, and a member of Washington's staff. Mr. Sweet assisted in the survey of the Nicaragua Canal in 1850 and 1851. After his return to the United States he was an assistant engineer on the New York State canals, serving for several years. In 1873 he was elected State Engineer and Surveyor on the Democratic ticket. At the time of his death he was in the employ of the Government as Consulting Engineer on work being done on the Hudson River in the vicinity of Albany. He was 69 years old.

—Mr. Lewis Lucas Troy, Superintendent of the Sixth Division United States Railway Mail Service, died in Chicago, Nov. 17. Mr. Troy was born in Bavaria Feb. 27, 1839, and came to this country when seven years old. He went to Illinois, where he worked until the civil war broke out, when he enlisted in the Ninth Illinois and was a Lieutenant at the close of the war. After the war Mr. Troy entered the railway mail service and soon became head clerk on the Chicago, Burlington & Quincy. In 1873 he was made Chief Clerk of the Sixth Division, and under President Harrison was appointed Superintendent in charge of the service in Illinois, Iowa, Nebraska, Wyoming, Montana, Dakota and Missouri.

—We noticed very briefly last week (page 799) the death of Mr. W. F. Durfee, and we can now give a few further particulars of his work. His cousin, Mr. Z. S. Durfee, represented the combination of American firms who had acquired the patents of William Kelly for the pneumatic treatment of iron, and he secured for these gentlemen Mushet's American patent. When it was decided to establish experimental work at Wyandotte, Mich., Mr. Z. S. Durfee employed his cousin, Mr. William F. Durfee, to design and build these works, which were established in the casting house of a charcoal blast furnace controlled by Capt. E. B. Ward, of Detroit. The plant was started in the fall of 1864, producing the first Bessemer steel made in America. Mr. W. F. Durfee had charge of the works as Engineer and Superintendent and personally made the first heats of steel; and it is of interest to note that the steel was from metal taken directly from the charcoal blast furnace.

Later on a reverberatory furnace was erected for remelting pig metal, also under Mr. W. F. Durfee's supervision, carrying out the directions of Mr. Z. S. Durfee, and this was the first attempt made to use cupola melted metal in the Bessemer filter. After Mr. Durfee resigned from the charge of these works, Capt. R. W. Hunt tore down the reverberatory furnace and put in its place a McKenzie cupola, using anthracite coal as a fuel.

Mr. Durfee was assisted by Lewellen M. Hart, an Englishman, who came from the Bessemer Works of Messrs. Petin, Gaudet & Co., in France. Mr. Hart was succeeded by Ignatius Hahn, who had been employed at the Krupp Works, in July, 1865, Mr. W. F. Durfee and Mr. Hahn were both succeeded at Wyandotte by Capt. Hunt.

Under Mr. Durfee's personal supervision the steel was made at Wyandotte, from which the first rails produced in America were rolled at the works of the Chicago Rolling Mill Company, May, 1865.

After leaving the Wyandotte Works, Mr. Durfee built the Bayview Merchant Mill at Milwaukee, practically owned by Capt. E. B. Ward. He probably remained in the employ of that company some time as engineer and then went to Bridgeport, Conn., where he built crucible steel works. Later on he was connected with various enterprises, as the Brook Iron Company, of Birdsboro, Pa., the Mitus process, C. W. Hunt & Co., etc.

ELECTIONS AND APPOINTMENTS.

Atlanta, Knoxville & Northern.—A. J. Dunn has been appointed Master Mechanic, with headquarters at Blue Ridge, Ga., succeeding T. W. Newell, resigned.

Busk Tunnel.—At a meeting of the stockholders, held Nov. 18, the following officers were elected: President, L. M. Cuthbert; Vice-President, W. R. Freeman; Secretary, L. R. Johnson, and Treasurer, L. G. Cannon.

Carolina Northern.—D. H. Wiley has been appointed Assistant Engineer, succeeding H. L. Cumming.

Central of New Jersey.—C. F. Lippincott, Division Trainmaster at Ashley, Pa., has resigned.

Central Vermont.—J. E. Toohey, heretofore with the Edge Moor Bridge Co., at Edge Moor, Del., has been appointed Superintendent of Bridges and Buildings, with headquarters at St. Albans, Vt., succeeding D. A. Sheedy, resigned.

Chicago, Milwaukee & St. Paul.—As we go to press we learn that the appointment of a Superintendent of Motive Power has not been made, but that Mr. S. P. Bush will "probably" be appointed. For some days the rumors have pointed persistently that way.

B. F. Van Vliet, heretofore Triamaster at Mason City, Ia., has been appointed Division Superintendent, with headquarters at Milwaukee, Wis., succeeding J. M. Bunker, resigned.

Cincinnati, New Orleans & Texas Pacific.—William J. Murphy has been appointed General Manager, with headquarters at Odd Fellows' Temple, Cincinnati, O., effective Nov. 16.

Colorado & Southern.—At a meeting of the stockholders held Nov. 16, Edward C. Henderson and Edward J. Berwind were elected Directors.

Delaware, Lackawanna & Western.—George A. Cullen has been appointed General Western Passenger Agent, with headquarters at Chicago, Ill., effective Dec. 1. C. H. Ketchum has been appointed Terminal Agent, in charge of the handling of its freight and livery business at its New York, Brooklyn and Hoboken terminals, with headquarters at Cortlandt St., Pier 13, New York.

Denver & Rio Grande.—F. S. Harris has been appointed Assistant Division Superintendent, with headquarters at Pueblo, Colo.

Durham & Northern.—W. A. Erwin has been elected a Director.

Georgia RR. & Banking Co.—Henry B. King was, on Nov. 14, elected a Director, succeeding Wm. M. Reese, deceased.

Great Northern.—J. C. Nolan, heretofore Master Mechanic at Breckenridge, Minn., has been transferred as Master Mechanic of the Montana Division, with headquarters at Havre, Mont., succeeding G. T. Sanderson, transferred.

Houston & Texas Central.—Captain M. G. Howe has been appointed Engineer Maintenance of Way, with headquarters at Houston, Tex., succeeding J. T. Mahl, resigned.

Jacksonville & St. Louis.—William Hansbrough has been appointed Car Accountant, succeeding E. B. Fry, resigned, effective Nov. 13.

Kansas & Southern.—The officers of this company (see RR. Construction column) are: President and General Manager, Irving H. Wheatcroft, St. Louis, Mo.; Vice-President, L. R. Moore, Jr., Kansas City, Mo.; Treasurer, Norton Thayer, Kansas City, Mo.; Secretary, C. S. Wheeler; Auditor, F. A. Siefert, St. Louis, Mo., and Chief Engineer, Geo. G. Moore, Westmoreland, Kan.

Lake Erie & Detroit River.—Owing to the small amount of passenger business across Lake Erie, O. J. Hammon will, for the time being, take charge of both the Freight and Passenger business of this company.

Mobile & Ohio.—W. N. Jones, heretofore Assistant Division Superintendent, has been appointed Assistant Superintendent of the entire Mobile Division, with headquarters at Artesia, Miss.

Montana.—G. F. Wentworth has been appointed General Superintendent.

Oregon Short Line.—On Nov. 15, Edward H. Harri-man was elected President, succeeding W. D. Cornish and Mr. Cornish was elected Vice-President.

Pennsylvania.—Jos. B. Hutchison, Jr., son of General Manager J. B. Hutchison, has been appointed Assistant Supervisor of the Western Pennsylvania Division, succeeding Elisha Lee, who has been transferred as Assistant Supervisor of the West Jersey & Seashore. R. Silvis, formerly Assistant Supervisor of the Amboy Division, has been appointed Assistant Supervisor of the New York Division of the Pennsylvania, with headquarters at Tacony, Pa., succeeding Mr. Keenan.

Raleigh & Gaston.—At a meeting of the stockholders the following Directors were chosen: J. H. Keyser, Henry A. Parr, D. H. Thomas, J. C. Williams, Jr., B. Cameron, and B. N. Duke.

St. Louis, Caruthersville & Memphis.—The officers of this company referred to in the Construction column are: President, T. Brinkerhoff, Fremont, O.; Vice-President, I. W. Worth, Fremont; General Manager, F. J. Cunningham, Caruthersville, Mo.; Secretary and Treasurer, J. W. Cunningham; General Superintendent, I. H. Burgoon, Caruthersville.

St. Louis, Peoria & Northern.—E. DeSilva has been appointed Acting Master Mechanic, succeeding W. J. Hemphill, resigned.

San Francisco & San Joaquin Valley.—Andrew Smith, whose appointment as Superintendent of Telegraph of the S. F. & S. J. V. was noted last week (p. 799), has not resigned as Superintendent of Telegraph of the Santa Fe. Mr. Smith, in addition to his new duties, retains the position of Superintendent of Telegraph of the S. F., and the Southern California.

Seaboard Air Line.—Edwin Butler has been appointed Soliciting Freight Agent, with headquarters at 306 Washington St., Boston, Mass.

Toledo Belt.—At a meeting of the stockholders held Nov. 14, H. J. Booth was elected Treasurer and J. H. Dowland Secretary.

RAILROAD CONSTRUCTION. New Incorporations, Surveys, Etc.

ALASKA ROADS.—Press reports state that a tunnel is being driven through Chilkoot Pass for a railroad from Dyea, Alaska, to the Yukon. L. D. Kenney of Seattle, Wash., is interested.

ARKANSAS WESTERN.—This company proposes to build from Hot Springs, Ark., via Waldron, to Wister Junction, I. T., 115 miles. Surveys are in progress from Wister Junction to Waldron, 45 miles, and the company expects to begin grading in January. C. C. Godman is President, and L. C. Torrence Chief Engineer, both of Fort Smith, Ark.

ATCHISON, TOPEKA & SANTA FE.—With reference to the improvements at Bellevue, Tex., an officer of the Gulf, Colorado & Santa Fe writes that the company is putting in a division yard that will be practically two yards—one of 40 and the other of 60 cars capacity; also a 16-stall stone engine house; double engine yard, with cinder pits; a 30-pocket coal chute; three repair tracks and reservoir with water tank columns, etc. (Nov. 3, p. 769.) It has been decided to build a joint line with the Chicago, Rock Island & Pacific from Kingfisher, O. T., southeast 25 miles up the Cottonwood Valley to Guthrie.

Bright & Crandall, according to report, have begun grading the four-mile spur from Richfield, Cal., to oil wells. (Sept. 15, p. 649.)

ATLANTA BELT.—Grading is begun on this belt line at Atlanta, Ga., being built in the interest of the Atlanta & West Point. Geo. C. Smith, Atlanta, is President, and G. F. Huggans, of Montgomery, Ala., Chief Engineer. A. & C. Wright & Co., of Richmond, Va., have the contract. (Nov. 10, p. 787.)

ATLANTIC & NORTH CAROLINA.—The directors have authorized the President to borrow \$50,000 to be expended on betterments. Dividends are also omitted for the coming year, the money to be used for the same purpose.

ATLANTIC COAST LINE.—The cut-off between Reams, Va., and Stony Creek (Aug. 4, p. 560) is practically completed, but is not yet open for business. (Official.)

BALTIMORE & OHIO.—Work is to be begun at once in cutting down the grades on the Chicago Division and the company expects to have the heavy work completed by spring. The plan ultimately proposed is an 18-ft. maximum grade from Chicago to Baltimore, except over the mountains. The Chicago Division work includes reductions between Tiffin, O., and Attica, 16 miles, now a 28-ft. grade. The heaviest cut will be at Republic, requiring an excavation of 350,000 cu. yds. Loss & Co., of Chicago, have the contract. They have also the contract for reducing the grades at Teegarden, Ind., from 28 to 16 ft., requiring the removal of 175,000 cu. yds. Between Garrett and Ripley, Ind., the line is to be relocated for seven miles, reducing the grade in both directions from 26 ft. to 16 ft. (Nov. 10, p. 787.) These reductions will cost about \$300,000, but will permit the increase of train loading over these sections about 30 per cent. (Official.)

BURLINGTON, CEDAR RAPIDS & NORTHERN.—Track laying is begun on the extension from Worthington northwest 45 miles to Jasper, Minn. It is to be ultimately extended to Canova, S. D., about 100 miles. (Nov. 10, p. 787.)

CANADIAN PACIFIC.—Track laying is begun on the Waskada & Western extension from Deloraine, Man., westward, and the work is being pushed to get the branch open before winter. (Nov. 3, p. 769.)

While waiting for the materials for the extension to Midway, B. C., the company is building the spur from Eholt Pass, B. C., south 11½ miles to Wellington Camp. (May 5, p. 323.)

Work is being rushed on the Bulldog Tunnel on the Columbia & Western extension between Robson and Midway. There was 200 ft. of rock bored on the east end and 80 ft. on the west end last week. The track is now laid over the tunnel, but the company expects by March to run trains through the tunnel, which will give access to the Burnt Valley District. (Oct. 27, p. 733.)

Messrs. Marshall, Davis & McNeil, of Vancouver, B. C., are applying for a charter on behalf of the C. P. R., to build a line which will change the entrance into Vancouver. Instead of going direct to Vancouver from Mission Junction, the intention is to divert the road to New Westminster and thence to Vancouver, making New Westminster a main line station instead of being on a branch as heretofore. (Nov. 11, 1898, p. 820.)

An officer writes denying knowledge of any proposed extension from Rossland, B. C., to the Sophie Mountain mines. (Nov. 10, p. 787.)

At the next session of the Dominion Parliament the company will apply for an act authorizing the building or purchase of the following roads:

From Deloraine, Manitoba, thence southwesterly to a point in Township No. 1 or 2, thence westerly 100 miles; from a point on the Manitoba Southwestern Colonization between Manitou and Pilot Mound, in a southerly direction to a point at or near the international boundary; from a point on the last-mentioned railroad in Township No. 1 or 2, thence easterly 50 miles; from a point in Township No. 1 or 2, between the Manitoba Southwestern Colonization and a point at or near the international boundary, thence westerly 50 miles; from McGregor, on the company's main line in Manitoba, thence westerly and northwesterly to Varcoe, about 56 miles; from West Selkirk in a northerly and northwesterly direction to some point on the west shore of Lake Winnipeg; from a point on the company's main line at or near Molson station, Manitoba, thence northerly and northwesterly to a point on Lac du Bonnet or Winnipeg River, about 26 miles; from a point on the company's line at New Westminster, thence to Vancouver, as may be found most direct and feasible.

CENTRAL OF GEORGIA.—Track is laid and in use on the Bruton & Pineora extension from Stillmore, Ga., east 20 miles to Register Still. (Jan. 13, p. 133.)

The company has finished the Porterdales extension (May 3, p. 161) of four miles from Covington, Ga., to the Porterdales Mills. (Official.)

CHICAGO, INDIANAPOLIS & LOUISVILLE.—The company is reported to have bought several hundred acres of coal lands near Linton, Ind., and will build a number of short branches.

CHICAGO, MILWAUKEE & ST. PAUL.—Through passenger and freight service was established Nov. 20 between Des Moines, Ia., and Sac City, including the new extension from Rockwell City northwest to Sac City. (Nov. 10, p. 787.)

The extension from Fonda north to Spencer has been completed between Spencer and Marathon, on the Chicago & Northwestern, and track is being laid between Marathon and Fonda. The company expects to have the line completed within two weeks. (Sept. 29, p. 660.)

The Flick & Johnson Construction Co., of Davenport, Ia., which has the contract for grading and bridging the extension from Yankton, S. D., west 24 miles to Tyndall, has been awarded the contract for 63 miles more to the Platte River. There are 150 teams at work between Yankton and Tyndall, with 10 miles of grading completed and three miles of track laid. It is proposed to begin grading at once west of Tyndall. (Nov. 10, p. 787.)

CHICAGO, ROCK ISLAND & PACIFIC.—The Enid & Tonkawa extension has been completed from Enid, O. T., east 27 miles to Billings, and trains began running Nov. 19. This is to be the terminus for the present. (Nov. 17, p. 800.)

Grading is under way for about one-half the distance of the Gowrie & Northwestern extension from Gowrie, Ia., northwest 115 miles to Sibley. (Sept. 8, p. 633.) The company hopes to have about eight miles of track laid from Gowrie by Jan. 1. (Official.)

CHICAGO, WEATHERFORD & BRAZOS VALLEY.—Surveys are reported completed for this proposed line from Bridgeport, Tex., on the Chicago, Rock Island & Pacific, to run south 155 miles via Weatherford (36 miles), Granby (24 miles), Glen Rose (19 miles), Walnut (14 miles), Meridan (12 miles), Clifton (12 miles), and Valley Mills (12 miles) to Waco (26 miles). Colonel N. W. Buster, Mayor of Weatherford, and R. F. Weitzel of Weatherford are among those interested. The surveys were made under Mr. Weitzel.

CINCINNATI NORTHWESTERN.—This company was incorporated in Indiana, Nov. 16, with a capital stock of \$50,000, to build the road already noted in this column under this title, from Cincinnati, O.,

via Connersville to Richmond, Ind. The incorporators are: C. L. McCrea, Dayton, O.; C. B. McCrea and C. T. McCrea, College Hill, O.; J. Gordon Speers, Norwood, O.; C. B. Miller, Jr.; Covington, Ky.; Powell Crosby, Ben Collins, W. F. Hart, E. L. Johnson, J. M. Simon, A. Glass, E. R. Passel, J. C. Rogers, F. G. Wilson and Lewis H. Utz, Cincinnati, O. (May 12, p. 343.)

COLORADO & SOUTHERN.—The company, according to report, will build a branch line from South Platte, Col., south about 40 miles up the South Platte River and through the West Creek mining district, to the Colorado Midland near Lake George Station. A contest for right of way is now in the courts based on prior claims for a water storage reservoir and a common road.

COLORADO, TEXAS & MEXICAN.—The Texas Attorney-General on Nov. 17 approved the charter of this company (successor to the Colorado Valley), to build its line from Llano, Tex., via Abilene, Anderson and Stamford to Haskell, 200 miles. The main office is at Abilene. John M. Blackburn is Chief Engineer. Surveys are completed between Abilene and Haskell, 51.35 miles. (Aug. 4, p. 560.)

COLUMBIA SOUTHERN.—Track is graded for 13 miles on the extension from Moro, Ore., south 46 miles to Cross Hollow, and track laying on the 13-mile section is in progress. (Oct. 13, p. 719.)

COOS BAY, ROSEBERG & EASTERN.—Surveys are completed for the extension from Myrtle Point, Ore., via Remote and Camas to Roseberg, 70 miles. (Jan. 6, 1897, p. 15.) It is expected to begin building next year. (Official.)

COPPER RANGE.—Preliminary surveys are partially completed for the proposed extension from Houghton, Mich., to Calumet, 15 miles. Location will probably be finished in 90 days and the road built next year.

CORSICANA & SOUTHEASTERN.—F. C. Hand, of Corsicana, Tex., is interested in a road under this title projected from Corsicana, Tex., southeast about 220 miles to Sabine Pass. Wm. Elliot is Engineer.

CRIPPLE CREEK.—Final surveys are completed and estimates being prepared in New York City for this line from Cripple Creek, Col., north 35.3 miles to Canyon City. Terminals and right of way are secured. A. H. Crocker, Boston Bldg, Denver, Col., is General Manager, and Geo. H. Proctor, 27 Pine St., New York, President. (Oct. 13, p. 719.)

CRYSTAL BRANCH.—The company has extended its line beyond Redstone, Col., through Cervera, Janeway and Hot Springs to Placita, in all 20.1 miles. (Oct. 27, p. 753.)

A branch is also building from Redstone via Husby to Coal Basin, 12 miles. The work is being done by the company. (Oct. 28, 1898, p. 786.) There are 60 men and 12 teams at work. (Official.)

DELAWARE VALLEY & KINGSTON.—Chas. E. Webster, Chief Engineer, has taken up his headquarters at Port Jervis, N. Y., preparatory to running lines for this road, whose incorporation was noted last week to build along the old Delaware & Hudson canal towpath from Hawley east to Rondout, N. Y. It is stated that the only grade will be one of about 15 ft. per mile at Cuddebackville. (Nov. 17, p. 800.)

DOTHAN, HARTFORD & FLORIDA.—The Alabama Secretary of State has granted authority to J. P. Pelham (President), of Dothan, Ala.; W. J. Jenkins and W. F. Clemons to open books of subscription for this proposed line from Dothan, on the Alabama Midland, to run southwest about 25 miles to Hartford, and thence 81 miles more to St. Joe, Fla. (April 7, p. 253.)

ELIZABETH CITY & WESTERN.—Surveys are reported completed for this line from Elizabeth City, N. C., on the Norfolk & Southern, to run northwest 30 miles to Bosley. David Cox, of Hertford, N. C., Engineer in charge. (Sept. 8, p. 633.)

EL PASO & NORTHEASTERN.—The company has completed its main line as far as Capitan, N. M., 163 miles northeast from El Paso, Tex. (Oct. 13, p. 719.)

ERIE.—The company has decided not to build a stub line from Alfred Junction into Alfred. (Oct. 27, p. 753.)

EVANSVILLE & TERRE HAUTE.—An officer writes that the company has completed its extensions from Hymeria, Ind., to Alen Cave, 4.25 miles, and from Standard to Star City, 3.25 miles. (June 30, p. 483.)

FINDLAY, FORT WAYNE & WESTERN.—This line, according to report, is to be extended this winter from Findlay, O., to Tiffin.

FLINT & PERE MARQUETTE.—Work is about completed in standard gaging the Harbor Beach Division from Palms, Mich., to Sand Beach, 18.3 miles. (Official.)

GRAND TRUNK.—With reference to the proposed branch from Port Huron, Mich., south to the Jenks Ship Building yards, an officer writes that it is simply a short side track to hold five or six cars. It will probably be put in by the Ship Company. (March 10, p. 179.)

M. J. Griffin of Detroit is reported to have the contract for grading about 10 miles of double track from Port Huron, Mich., west to Goodells.

GREAT NORTHERN.—The Duluth, Mississippi River & Northern extension from Hibbing, Minn., east 20 miles to Virginia is reported completed. (June 2, p. 393.)

GULF & SHIP ISLAND.—The main line is being extended from Hattiesburg, Miss., northwest 92 miles, via Seminary, Ora, Mt. Olive, Coat, Dio, Braxton, and Steens Creek, to Jackson. Track is laid for about 30 miles. (Nov. 10, p. 787.)

The Laurel branch is to run from Laurel northwest 41 miles, passing near Taylorsville, Mize and Low to a point three miles north of Mt. Olive, where it will connect with the line to Jackson. Of this, 24 miles is completed and the rest under contract. (May 19, p. 359.)

The Columbia, Lumberton & Gulf extension is from Maxie west 49 miles to Columbia, of which 28 miles is completed, and building is in progress on the balance. (Nov. 10, p. 787.)

On the three extensions there is practically 70

miles yet to grade and 100 miles of track to lay. One bridge of 125 ft., and another of 85 ft. span, both steel, are not yet building.

New securities are to be issued for the entire 180 miles owned by the company. The Bradford Construction Co. is doing practically all the work, subletting only a small portion of it. S. S. Bullis, of Gulfport, Miss., is General Manager. (Official.)

GUYANDOT VALLEY.—Sealed proposals are asked up to Nov. 28, at the office of J. L. Caldwell, President, at Huntington, W. Va., for grading, masonry, trestle work, piles, bridges and rails for 30 miles of this line from Huntington, W. Va., southeast up the Guyandot River. (Nov. 3, p. 769. See also our advertising columns.)

INVERNESS & RICHMOND.—Rails are laid from Port Hastings, N. S., to Judique Chapel, 18 miles, and the company expects to have track laid to Port Hood by December. Ballasting is now in progress. The road is projected from Port Hawksbury, N. S., via Port Hood and Margaree to Cheticamp. D. D. Mann, of Mackenzie & Mann, Toronto, Ont., has the contract. (July 7, p. 499.)

IOWA & MISSISSIPPI VALLEY.—The company is ready to let contracts for work to be begun in the spring on this line from Oakville, Ia., south 22 miles to Burlington. G. M. Willis of Minneapolis, Minn., is Chief Engineer. (Nov. 3, p. 769.) W. R. Stewart of 11 Broadway, New York, is the Eastern Representative. (Official.)

KANSAS & SOUTHERN.—This line from Westmoreland, Kan., via Moodyville Springs to Blaine, Kan., has been completed and put in operation Nov. 1. The Southern Construction Co. of St. Louis are the builders. (May 12, p. 343.)

An extension is proposed from West Moreland to Wanago or Manhattan, 20 miles. Irving H. Wheatcroft of St. Louis, Mo., is President and General Manager, and Geo. G. Moore of Westmoreland, Chief Engineer. (Official.)

KANSAS CITY, FORT SCOTT & MEMPHIS.—An officer of the Kansas City, Memphis & Birmingham writes that there is no truth in the rumor that the company will build an extension from Birmingham, Ala., to Brunswick, Ga. (Nov. 10, p. 787.)

KANSAS CITY, PITTSBURGH & GULF.—An officer writes that nothing is being done with reference to the proposed branch from Lemon, Tex., on the main line, to run southeast about 13 miles to Orange. (March 10, p. 180.)

KENTUCKY WESTERN.—The Southern Construction Co. of St. Louis is building this line from Dixon, Ky., to Blackford, 20 miles, and expects to have the entire line graded by Dec. 1. About three-fourths of the grading is completed. Sub-contracts are to be let at once for bridging, pile-driving, trestles and track laying. About 150 men are at work. The maximum grade is one per cent. The road runs through an immense supply of semi-anthracite and canal coal of a fine quality. The company has a good traffic contract with the Illinois Central. (Sept. 22, p. 668.) Irving H. Wheatcroft of St. Louis, Mo., is President and General Manager; F. A. Siefert is Secretary and Treasurer. (Official.)

LAKE ERIE & WESTERN.—An extension is proposed, according to report, from Connersville, Ind., to run southeast about 50 miles to Cincinnati, O. The company is said to have obtained control of a short line out from Cincinnati.

LAKE SHORE & MICHIGAN SOUTHERN.—Official statement is received that the company will not build an extension from Andover, O., to New Castle, Pa. (March 10, p. 180.)

LEONTONIA.—The company has about five miles of track graded from a point near Leontonia, Pa., into the woods for hauling bark and logs. Track will be laid in the spring. (March 31, p. 235.) The company is successor to the Tiadaghton & Fahnesh-talk. (Official.)

LEHIGH VALLEY.—An officer writes that there is no foundation for the report that the company will build a branch from West Portland, N. J., north about 10 miles to Washington. (June 9, p. 417.)

LITTLE RIVER VALLEY.—J. P. Lahey of Horatio, Ark., has the contract for an extension from Neal Springs west 16 miles to Locksburg, I. T. Grading is completed for about two miles. There are 15 teams at work. (Feb. 3, p. 92.) D. C. Richardson of Horatio, Ark., is President. (Official.)

LOUISIANA EASTERN.—Surveys are reported completed for this line from Covington, La., to run north 28 miles to Franklinton. W. W. Babbington, of Franklinton, is President. (Oct. 27, p. 753.)

LOWELL & HASTINGS.—The extension from Lowell, Mich., north 16½ miles via Vergennes and Smyrna to Belding was completed Nov. 20. (Oct. 27, p. 753.)

The company has not yet decided as to the extensions from Belding north seven miles to Greenville, and from Freeport south eight miles to Hastings. (Official.)

MARSHALLTOWN & DAKOTA.—Track laying is completed on the extension from Fraser Junction, Ia., to Gowrie, 19 miles, and trains will be running within a few days. (Oct. 20, p. 737.)

MASSACHUSETTS ROADS.—A petition to the incoming Legislature has been filed with the Secretary of the Commonwealth to incorporate a railroad to run from Springfield west through Hampden and Berkshire counties into New York State. The incorporators are: H. F. Keith, T. T. Whiting, C. J. Burget, G. Will Platt, John A. Bemis, Orlando C. Bidwell and George W. Mellen.

MINNEAPOLIS, LITTLE ROCK & GULF.—This company was incorporated in Missouri Nov. 20, with a capital stock of \$2,250,000, to build from Bowling Green, on the Chicago & Alton, south about 225 miles via Hermann to West Plains, Howell County. The road is to be an extension of the C. & A.

MINNEAPOLIS & ST. LOUIS.—About 55 miles of track is laid and it is going down at the rate of about two miles a day on the extension from New Ulm, Minn., south 138 miles to Storm Lake, Ia. (Nov. 10, p. 787.)

No arrangements have been made for the spur referred to several months ago (May 19, p. 360), from Burnside, Ia., to Lehigh. (Official.)

MISCELLANEOUS COMPANIES.—The Dalhoff

Construction Co. of Little Rock, Ark., was incorporated in Arkansas, Nov. 8, with a capital stock of \$25,000, to build railroads, bridges, etc. H. Dalhoff is President.

MONTOUR & GREGG.—This company was incorporated in Pennsylvania Nov. 15, with a capital stock of \$30,000, to build a line three miles long in Allegheny County, from Gregg station on the Pittsburgh, Cincinnati, Chicago & St. Louis, to Montour. The directors are: James T. Armstrong (President), Glen-shaw; J. F. Scott, H. Kirke Porter, Pittsburgh; Wm. M. Shinn, Daniel Boden, W. R. Errett, Carnegie; and Y. L. Phillips, Mt. Lebanon.

MOULTRIE TERMINAL.—This company has completed this line from Moultrie, Ga., north about 25 miles to Tifton. M. F. Amarous, of Atlanta, is interested. (Jan. 20, p. 53.)

MT. JEWETT, CLERMONT & NORTHERN.—Grading is completed from Hazelhurst, Pa., through Smethport, 11 miles, to Campbells, 1½ miles more, and 12 miles of track is laid on the extension from Hazelhurst, Pa., northeast 17 miles via Wildcat, Martindale, Coombs, Smethport and Farmers Valley, to Coryville. The Interior Construction & Improvement Co. of 45 Wall St., New York, has the contract. (April 21, p. 289.)

A further extension from Coryville to the State line, 11½ miles, has been surveyed. (Official.)

MT. PLEASANT, TENNESSEE RIVER & MILAN.—This company is securing right of way for its proposed line from Mt. Pleasant, Tenn., to run northwest about 55 miles to the Tennessee River and thence to Milan. A. M. Hughes, of Columbia, Tenn., is President. (Oct. 20, p. 737.)

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Land has been bought, according to report, for a new switching yard at Chattanooga, Tenn., which the company has begun building.

NASHVILLE, FLORENCE & NORTHERN.—This company, whose incorporation was noted last week (p. 801), was organized at Nashville, Nov. 10, with the election of the following directors: Jere Baxter, Edgar Jones, R. L. Morris, Edward Buford, E. R. Richardson, G. P. Thurston and J. H. Thomas. The Directors elected Jere Baxter, of Nashville, President, and R. L. Morris, General Counsel.

NEW YORK, ONTARIO & WESTERN.—The company is reported to have begun enlarging its yards at Mayfield, Pa.

NEW YORK ROADS.—In connection with the Pan-American Exposition at Buffalo, N. Y. next year, it is proposed to begin at once the building of a series of track connections from the New York Central to the exposition buildings.

NORFOLK & SOUTHERN.—An officer writes that no work was ever begun on the proposed branch from Snowden, N. C., southeast about 30 miles via Currituck Sound to Powell's Point. (July 22, 1898, p. 538.)

NORFOLK & WESTERN.—Double track is reported about complete between Christiansburg and Montgomery, 4½ miles. The section between Montgomery and Ellison, 6½ miles, will require much tunnelling and will not be completed until next year. (Sept. 15, p. 650.)

Grading is reported nearly completed on the cut-off from Bellsprings, Va., to Vicksar's switch. A tunnel of 3,000 ft. is yet to be built. (Oct. 20, p. 737.)

NOVA SCOTIA SOUTHERN.—Track laying is finished from New Germany to the La Have River, and the company expects to have 96 miles built by June 1 and the entire line from Shelburne, N. S., to Halifax, 187 miles, completed by the close of 1900. Robert G. Hervey, of 80 Broadway, New York, is building the line. (Sept. 29, p. 685.)

PENNSYLVANIA.—Extensive additions are reported made to the yards at Columbia, Pa.

Stone ballasting is reported under way on the double tracks between Camden and Atlantic City, N. J.

W. E. Howley & Co. of Pittsburgh, and F. H. Clement & Co. of Philadelphia, have the contract for the Southwest Pennsylvania R.R. extension from Uniontown, via Cold Lick and Brown's Run, to the Monongahela River. Grading was begun Oct. 1 with a large force. There is to be a heavy summit cut, with a hillside line. The maximum grade will be two per cent. with traffic and one per cent. against it. The maximum curves are 10°. There will be small girder bridges. (Official.)

PHILADELPHIA & READING.—Work on double tracking is reported begun between Myertown, Pa., and Robesonia, about nine miles.

PITTSBURGH, SHAWMUT & NORTHERN.—The Interior Construction & Improvement Co. of 45 Wall St., New York, has the contract for the Central New York & Western connecting line from Bolivar, N. Y., north 22 miles via Rickburg, Wirt, Friendship and Belvidere to Angelica. The work has not yet begun. (Sept. 1, p. 620.)

No work is done yet on the Central New York & Western extension (Aug. 4, p. 560) from Wayland, N. Y., north 52 miles via Springwater, Canadice, Richmond, East Bloomfield, Bristol, Canandaigua and Farmington to Macedon. (Official.)

RALEIGH & EASTERN.—Two surveys have been made for this line from Raleigh, N. C., northeast through Wakefield and Earpsboro. One survey along Walnut Creek is 25 miles, and another along the Crabtree 23 miles. E. B. Barbee, of Raleigh, is a stockholder. (Oct. 13, p. 719.)

RICHMOND & TIDEWATER.—Surveys are reported in progress for this line from Ellerson, Va., near Richmond, on the Chesapeake & Ohio, to run east about 60 miles to tidewater in Gloucester and Mathews counties. (Oct. 27, p. 753.)

RIO GRANDE WESTERN.—The plans for improvements on the line between Salt Lake City, Utah, and Park City, according to report, will include the broad gaging of the line, a tunnel about 800 ft. long over the summit, a cut-off between Barclay and Altus, already building, and the cutting down of the grade between Altus and Gorgorza. (Oct. 13, p. 719.)

ST. LOUIS & SAN FRANCISCO.—Surveys are to be made soon, according to report, for a cut-off to shorten the line from St. Louis to Kansas City. One proposed route is over the old road-bed of the

Lacredé & Fort Scott, which was graded some years ago, but never completed from Lebanon, Mo., west about 45 miles via Buffalo to Bolivar. Another proposed route is from Lebanon directly west about 70 miles to Osceola.

Surveys are reported completed for an extension from Oklahoma City, O. T., southwest about 150 miles via Chickasha and Fort Sill, O. T., to a point in Texas. This is probably under the Oklahoma City & Western, incorporated last summer as an extension of the St. L. & S. F. (O. C. & W., Aug. 4, p. 561.)

ST. LOUIS, CARUTHERSVILLE & MEMPHIS.—Most of this line is completed from Caruthersville, Mo., southwest 27 miles via Mounds, Canady, Pocomto, Steele, Holland and Shady Grove to Blytheville, and the company expects to have all completed within 30 days. There are 300 men at work. Trestles 400 ft. and 800 ft. long are needed at Grassy Bayou and 144 ft. at another point. The officers are given under Elections and Appointments. (Nov. 17, p. 801.)

SAN FRANCISCO & SAN JOAQUIN VALLEY.—The 830-ft. tunnel near Pinole is reported just completed, on the extension from Stockton, Cal., west 69 miles to Point Richmond, opposite San Francisco. The grading contracts are completed between Pinole and the entrance of the tunnel, and the grading and tunneling beyond Pinole is nearly completed. The Thomson Bridge Co. of San Francisco is building the slips at the Point Richmond terminal. The bridge over Old River is completed; also that over Middleway River. The intention is to have the entire line ready by the end of the year. (Oct. 20, p. 737.)

SEABOARD AIR LINE.—Practically all the grading is reported completed on the Georgia & Alabama extension from Savannah west 20 miles to Meldrim, and 4½ miles of track is laid from the Savannah River toward Meldrim. The river is to be crossed with a steel drawbridge. (Aug. 18, p. 589.)

SOUTHEASTERN.—Eight miles of track is reported laid on the line from Ashpole, N. C., on the Atlantic Coast Line, to run southeast 12 miles to Hub on the A. C. L., which is supposed to be back of the project. The remaining mileage is to be in operation before Jan. 1. (Sept. 8, p. 633.)

SOUTHERN.—All the grading is reported completed from Cayce, S. C., just below Columbia, to run south 32 miles to Perry, on the Carolina Midland. This includes a cut through Sand Mountain just beyond Perry. Track is being laid at either end and is rapidly approaching the cut. (Oct. 27, p. 753.)

New yards with 10 to 12 miles of track are to be built, according to report, near the Lonsdale shops, at Knoxville, Tenn.

SOUTHERN PACIFIC.—The route of the proposed line from Wharton, Tex., is southeast 30 miles along the Caney Bayou to a point in Matagorda County. Location surveys are completed. The contract for grading and track laying only, on the first 15 miles, was let on Nov. 11. All the other work is to be undertaken by the company's force. (Nov. 17, p. 801.) The work is very light. There will be no iron or steel bridges nor important trestles. (Official.)

WASHINGTON.—This company has been incorporated by the Oregon Railroad & Navigation Co. to build extensions in Washington and Oregon as follows:

From Touchet Station, Wash., northeast about 25 miles to Prescott, forming a cut-off.

Branch from Dayton, Wash., southeast to the State line.

Branch from Pendleton, Ore., south to the headwaters of Birch Creek.

Branch from Pomeroy, Wash., east to Vineland, in Asotin County. The incorporators are J. C. Havley, Chas. Steele and G. W. Mulks.

WESTERN MARYLAND.—An officer writes that the company does not intend to extend the Emmitsburg Branch from Rocky Ridge, Md., to Woodsboro. (Nov. 10, p. 788.)

WEST VIRGINIA ROADS.—James B. Caldwell of Keyser, W. Va., is reported to have completed a preliminary survey for a railroad from that city, on the Baltimore & Ohio, to run south about 30 miles via Maysville & Petersburg to Moorefield. The road is said to be for the United States Leather Co.

YOUNGSTOWN & RAVENNA.—This company will be officered by men who are now officers of the Pennsylvania Company. It is to form part of that company's system, giving a shorter route from Pittsburgh to Cleveland via Youngstown. It leaves the main line at Niles, O., passing through Newton Falls to a connection with the Cleveland & Pittsburgh road at Ravenna. The roadbed is partially built and will probably soon be completed. The work is light. (Nov. 10, p. 788.) Grades and curves are very light. (Official.)

GENERAL RAILROAD NEWS.

ATHENS SOUTHERN.—Application was made for a charter for this company, with a capital stock of \$300,000, in Georgia, Nov. 12, as successor to the Northeastern of Georgia which runs from Athens, Ga., to Lulu, 39.4 miles, and was sold to representatives of the Southern Ry. for \$307,000. (Nov. 10, p. 788.)

BALTIMORE & OHIO.—At a meeting of the Pittsburgh Junction road in Pittsburgh, Nov. 14, the Baltimore & Ohio obtained majority representation on the Board of Directors, thus insuring this road to the B. & O. system. (Oct. 13, p. 720.)

Holders of certificates of deposit for Schuylkill East Side first mortgage 5 per cent. bonds may have them stamped in accordance with the agreement, upon presentation to the Pennsylvania Co., for insurance on lives and granting annuities, at Philadelphia.

BOSTON & ALBANY.—The New York Central & Hudson River has made a new offer to the B. & A., increasing the sum in addition to the 8 per cent. rental, from \$4,000,000 to \$5,500,000. The special meeting of the stockholders held on Nov. 15 was adjourned to Dec. 27, and it is understood that the new offer is satisfactory to the interests represented by the Protective Committee. President Callaway, of the New York Central, says: "The form of the lease has been modified to meet the objections presented, but without any material change in substance."

The term has been reduced from 999 years to 99 years, and the Central agrees to pay for certain real and personal property not included in the lease \$5,500,000 in its 3½ per cent. debenture bonds instead of \$4,000,000, as under the former plan." All interested seem now satisfied that the lease will be ratified and go into effect July 1, 1900. The increased payment will make the dividend on the Boston & Albany stock about 8½ per cent. (Oct. 6, p. 702.)

BUSK TUNNEL.—C. J. Hambro & Son of London are delivering to holders of first 7 per cent. bonds the committee's certificates for general mortgage 2-3-4 per cent. bonds of the Colorado Midland, bond for bond. (June 30, p. 484.)

CHICAGO GREAT WESTERN.—Holders of Chicago, St. Paul & Kansas City 5 per cent. minority bonds for £582,250, are notified that instead of receiving cash for them at 105, January next, they are offered the option to exchange them into C. G. W. 4 per cent. debenture stock as follows: For each £100 bond the holders receive £2 10s. in cash for interest, and \$560 (£115 10s.) of the 4 per cent. debenture stock, bearing interest from Jan. 1, 1900. (Sept. 8, p. 633.)

KICKAPOO VALLEY & NORTHERN.—Milwaukee press reports state that this company has been entirely reorganized with Norman L. James as General Manager, and the road will be operated in connection with the Chicago, Milwaukee & St. Paul, with which it connects at Wausau, Wis. It was sold at public auction Oct. 2. (Oct. 6, p. 702.)

LEHIGH VALLEY.—Reports are that the company has bought the rest of the stock of the New York Lighterage & Transportation Co., of which one-half was already owned. The company has a fleet of about 60 tugs, barges and lighters which will be used exclusively for doing the transportation business of the railroad at New York.

MEMPHIS & CHARLESTON.—The suit of the minority stockholders to prevent the sale of this property to the Southern Ry. has been indefinitely postponed. (Aug. 11, p. 576.)

PENNSYLVANIA COMPANY.—The directors of the Pittsburgh, Wheeling & Kentucky have on hand \$4,391, for which they ask bids until Dec. 15 for \$4,000 first mortgage consolidated bonds of the company.

PEORIA, DECATUR & EVANSVILLE.—Judge Allen in the United States Circuit Court at Springfield, Ill., on Nov. 18, entered a decree of foreclosure sale of this property to take place at Mattoon, Ill., at a date to be fixed. (Oct. 6, p. 702.)

SOUTHERN PACIFIC.—The syndicate headed by Speyer & Co., New York, which recently bought about 250,000 shares of the S. P. Co.'s stock from the Crocker estate, has also bought the stock of the Stanford estate, about 285,000 shares, for which it is stated \$11,400,000, or \$40 per share, was paid. It is understood that the stock controlled by the syndicate and by those friendly to it, including Mr. Huntington, represents a controlling interest. (Nov. 17, p. 802.)

UNION PACIFIC, CENTRAL BRANCH.—The bond holders' committee gives notice that in pursuance of the plan approved March 1, 1899, holders of Atchison, Colorado & Pacific first mortgage 6 per cent. bonds, and Atchison, Jewell County & Western first mortgage 6 per cent. bonds, will receive 75 per cent. of the face value of their bonds in the new 4 per cent. Central Branch bonds guaranteed as to principal and interest by the Missouri Pacific. (March 3, p. 198.)

WESTERN MARYLAND.—The Finance Commissioners of the city of Baltimore have decided favorably upon a proposition from a New York syndicate to buy the city's interest in this property for \$4,485,000, which is the principal of the debt owed to the city by the road. The object of the syndicate is said to be the establishment of a competing line to Chicago, of which the W. M. is to form a part. The plan is to sell the property under foreclosure in a court of equity, the city to buy it in.

TRAFFIC.

Traffic Notes.

It is announced that Flint, Dearborn & Co. of New York are to run large steel steamships from New York and Philadelphia to San Francisco and Honolulu, around Cape Horn, every 45 days. Three new steamships are being built for this line.

The United States Circuit Court of Appeals at Cincinnati has sustained the Lower Court in its decision, handed down several months ago, on freight rates from New York and other eastern cities to Chattanooga. The suit was against the East Tennessee, Virginia & Georgia Railroad, and others. Rates to Chattanooga were higher than those to Nashville, 150 miles farther from the Atlantic Seaboard, and the decision holds that this was a violation of the fourth section of the Interstate Commerce law.

At the hearing before the Interstate Commerce Commission in St. Louis last week the St. Louis shippers produced telegrams from a number of merchants in California protesting against any increase of the difference between C. L. and L. C. L. rates on freight from St. Louis to the Pacific Coast. A heavy shipper from St. Louis said that he did not object very strenuously to the demand of the San Francisco jobbers for a reduction in C. L. or an advance in L. C. L. rates, as the action of those shippers had alienated the retailers of the Pacific Coast and driven them to increase their purchases in St. Louis.

At the annual meeting of the Guarantee Ticket Brokers' Association, at Detroit, last week, it was decided to raise \$10,000 to oppose legislation in Congress unfavorable to ticket brokerage. At the same time it is reported that a number of prominent railroads, which maintained a "bureau" at Washington last winter, will, on the assembling of Congress, again send a committee to Washington to try to secure the passage of an anti-scalping bill.

Interstate Commerce Commission.

The Commission has issued its decision in the case of the Chicago Fire Proof Covering Co. against the Chicago & Northwestern and the Pennsylvania Company.

It was claimed that these carriers charged unlawful rates on asbestos articles from Summerdale, Ill., to Lima, O., and other eastern points, and it appeared that Summerdale, although within the city limits of Chicago, is a station on the Chicago & Northwestern, which for purposes of shipment and carriage is independent of the main depots of that company in Chicago; that it is a shorter distance point, and Milwaukee and other places on the Milwaukee division of the C. & N. W. north of Summerdale are longer distance points, over defendants' established through line with reference to L. C. L. shipments to eastern destinations; that defendants have through rates in effect from stations north of Chicago, but on traffic from Summerdale the Penn. Co. insists upon a high charge, made by adding rates to and from the point of connection in Chicago; that these through rates were not denied to Summerdale before it became part of Chicago by extension of the city limits; and that the circumstances and conditions governing the transportation are not dissimilar. Held, That defendants' higher rates on asbestos articles from Summerdale than from points north of Chicago, on shipments destined to Lima, O., and other eastern points, are in violation of sections 3 and 4 of the statute.

Notwithstanding the contention that higher rates are lawfully in force on shipments from Summerdale than from Milwaukee and other more distant points to eastern localities, it appears that, under the tariffs in force over defendants' through line, the rates from Summerdale were actually the same as those from more distant stations, including Milwaukee, at a time a lot of asbestos pipe cover was shipped by complainant from Summerdale to Lima, O. Held, That in failing to apply the through Milwaukee-division rates from Summerdale on such shipment the defendants acted contrary to the requirements of section 6 of the Act, and that complainant is entitled to recover the overcharge.

Apparently the rates on carload shipments to the East from Summerdale should be as low as those in force to the same destination from Milwaukee, but as carload lots take somewhat different routing than less than carloads from Summerdale, and the evidence as to carloads was not specific, no opinion on that branch of the case is expressed, and complainant is granted leave to apply for further hearing.

Rates from Kansas City to Texas and the Gulf.

The Interstate Commerce Commission has announced its decision in the case of the Board of Railroad Commissioners of the State of Kansas against the Atchison, Topeka & Santa Fe Railway Company and other carriers. The main points decided by the Commission are as follows:

The changes in conditions governing the transportation of wheat and flour from Kansas points to Texas are not sufficient to warrant interference in this case with the differential making the rate 5 cents higher on flour than on wheat.

Carriers of corn and cornmeal from Kansas points to destinations in Texas enforce a differential of 7 cents per 100 pounds more on cornmeal than on corn, and such difference prohibits the shipment of cornmeal ground at Kansas points into Texas territory. Held, That the difference in rate of 7 cents against cornmeal and in favor of corn unjustly discriminates against Kansas millers, and that the differential should not exceed 3 cents per 100 pounds.

Several defendant carriers engaged in transporting wheat and corn from points in Kansas and Missouri and intermediate points to Galveston and New Orleans, make lower export rates on those commodities from Kansas City than from intermediate stations. Held, That the higher rates from such intermediate points subject those localities to undue prejudice, and that if the carriers are allowed to make these low export rates, they should in making them treat all intermediate territory alike, and desist henceforth from charging higher rates from the nearer stations than those in effect from the more distant points.

Chicago Traffic Matters.

Chicago, Nov. 22, 1899.

Nothing particularly sensational has yet been said before the sub-committee of the Industrial commission now in session here. Though it was given out that the principal object of the sub-committee was to dig into alleged discriminations in freight rates, most of the time has been consumed in board-of-trade questions. The most interesting witness, from a railroad standpoint, was Railroad Commissioner Reagan, of Texas. Among other things, Mr. Reagan said, as it was not possible to regulate railroad rates under present statutes, the next best thing would be a regulated pool, severe penalties following violations of contracts. He opposed government ownership. Ticket scalping, he said, ought to be made a penal offense. Mr. Reagan's evidence was in the form of a carefully prepared paper, the following being the principal points:

"1. Congress should empower the interstate commerce commission to make, regulate and maintain freight rates and passenger fares, as these relate to interstate and foreign commerce, and the several legislatures should make like provision for state traffic.

"2. The right of the commission to make, regulate and maintain rates should be subject to appeal to the courts on questions of law only.

"3. The allowance of free passes not done as a matter of charity, but for the most part to public officials and influential persons, is unjust and demoralizing and should be prohibited by Congress and legislatures.

John J. Hyland, Traffic Manager of the Board of Trade Freight Bureau, read a short paper, in which he opposed railroad pools.

Officers of the St. Paul-Chicago lines have made a proposition to the roads east-bound from this city that the latter join the northwestern roads in putting in a \$16 one-way second-class steamship rate from the twin cities to New York, Philadelphia and Boston, via Chicago, and a rate of \$17 to Boston. To offset this reduction those making the proposition suggest that no more commissions be paid steamship agents in the northwest for obtaining this class of business. Officers of a majority of the east-bound lines are opposed to this proposition, on the ground that the result would demoralize passenger rates between Chicago and the eastern cities. Canadian Pacific competition is the reason for offering the proposition.

Some time ago the Southwestern Passenger Association adopted a rule that only the Sebastian form should be used in that territory for tourist tickets. The Missouri, Kansas & Texas road has now given notice that it will ignore this rule and will accept any recognized punch-descriptive ticket.